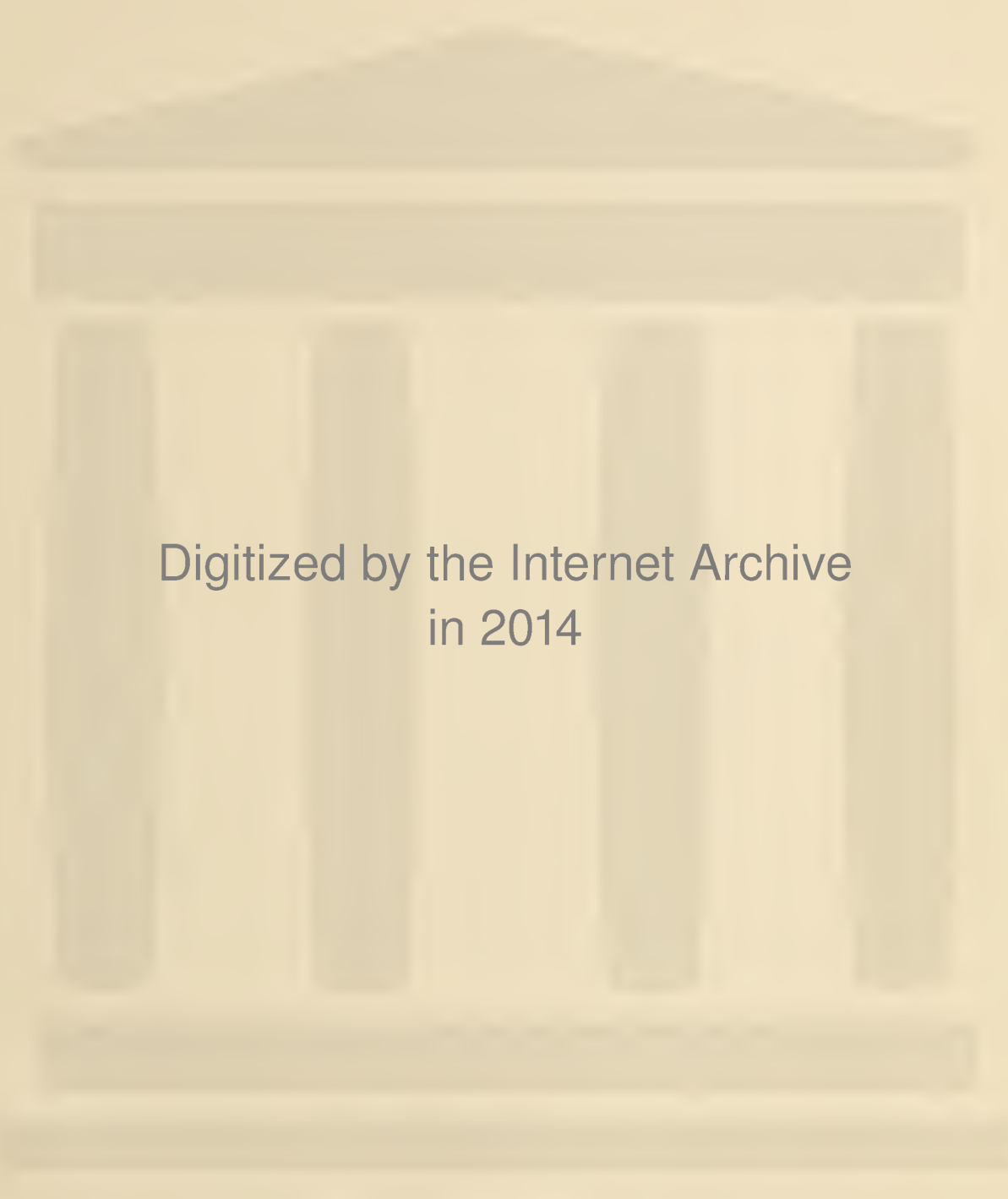




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Canadian Mining Review.

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OFFICE:

CHAMBERS, 14 Metcalfe Street.

Other
in, early, 1883, number of the
MINING REVIEW is the first
issued under a new manage-
ment. It is the intention of the
publishers to continue the publica-
tion of the REVIEW as a monthly
paper, devoted to the mining inter-
ests of the Dominion of Canada;
special attention, however, will be
given to the mining industries in
the Ottawa Valley and Manitoba, as
may be seen by the articles appear-
ing in this number. Information
concerning Canadian Mines and
Mineral Lands is respectfully solicit-
ed by the publishers, who assure
respondents that all reliable in-
formation of this nature will find
its way, without prejudiced comment,
into the columns of the REVIEW. This
paper has an extensive circulation
throughout the Dominion of Canada,
the United States, in Great
Britain and in Europe, and one of
its objects is to bring the owners of
mineral and other lands into closer
contact with capitalists seeking in-
vestment, with a view to the speedy
development of Canadian mines;
in order that our aim in this
direction may be attained, a liberal
amount from both parties will be
necessary. The advertising columns
of the paper are always open to
those who have properties for sale,
to intending purchasers, as well
to merchants generally; dealers
in machinery and mining supplies
will find the REVIEW a valuable ad-
vertising medium.

Address all Correspondence
to the Publishers, CANADIAN MINING
REVIEW, Ottawa.

We beg to call attention to the
advertisements, in another column,
of mineral lands for sale. True re-
sults of all properties mentioned
therein will be forwarded, on appli-
cation, by the publishers of the
REVIEW.

PHOSPHATE MINING.

This is becoming a most impor-
tant industry in the vicinity of
Ottawa, and has already developed
to such an extent that it is difficult
to say how soon it may throw the
lumber interests completely in the
shade. It is not many years ago
that this mineral was comparatively
unknown to the inhabitants of the
Ottawa Valley, while to-day there
is an activity prevailing at mines
throughout the phosphate district
that would do credit to a people
who had spent their lives in a
mining camp.

During the past winter the road
on the ice of the Rivière du Lièvre,
leading to Buckingham Station on
the line of the Canadian Pacific
Railway, presented a busy scene,
such as had never before been wit-
nessed in that locality. Hundreds
of teams were engaged in hauling
phosphate from the various mines,
and by the time the ice gave way
on the river, and hauling became
impracticable, no less than 10,000
tons of first quality ore, running as
high as 85 per cent. of phosphate
lime, besides many hundred tons of
second quality (60 per cent.) had
been delivered at the station ready
for shipping. In addition to this,
about 1,500 tons in all were deliver-
ed at the Templeton Station on the
line of the same railway. This far
exceeds in quantity the output of
any former year, and is attributed,
mainly, to the prevailing high price
offered for ore, and to the fact that
many of the most productive prop-
erties have fallen into the hands
of English, French, and American
companies.

The great drawback experienced
heretofore by those engaged in
mining was the want of capital to
prosecute operations to advantage.
Mining had to be carried on during
the whole year, while delivery of
the output could only be made in
winter, thus necessitating a con-
tinuous drain on the funds of the
miner for nearly nine months.

The promoters of the enterprise
in the County of Ottawa were not
men of means, but, for the most
part, farmers and men of limited
resources. To-day the more valu-
able developed properties are con-
trolled and worked by capitalists
who are conducting their operations
on an extensive, though economical,
scale, producing the ore at a mini-
mum of cost, employing an enor-
mous amount of local labour, cir-
culating money in the country, and

reaping the fruits of their labours
selves, so that the industry is
self-sustaining and corresponds

to the phosphate zone in the
County of Ottawa extends from the
west boundary of the Township of
Hull, about 8 miles north from the
Ottawa River, and, following a
northeasterly direction, passes
through that township and the
townships of Wakefield, Templeton,
East and West Portland, Bowman
and others north and east of those
named. This belt is from 8 to 10
miles in width, and is clearly de-
fined in the maps and on the reports
published by the Canadian Geolo-
gical Department. There is ample
field for many times the amount of
capital now employed in this dis-
trict, and virgin properties are yet
to be had that will, without doubt,
equal in richness any of those at
present in operation; all they re-
quire is developing, and, to accom-
plish this, capital alone is necessary.

It has been estimated that the
cost of mining and delivering the
mineral at different points for ship-
ment varies from \$4 to \$7 per ton,
according to the location of the
mine and the nature of the deposits,
and, as the price paid for the high
grade ore is about \$21 per ton at
the railway station, it may be seen
what a handsome profit is derived
by those engaged in mining. It is
claimed for the Canadian apatite
that it is of a superior quality to
that found in any other part of the
world, on account of its purity and
for its high percentage of phosphate
of lime. Specimens of it were ex-
hibited at the Centennial Exhibition
in Philadelphia in 1876, and attract-
ed considerable attention from those
familiar with the mineral. Many
specimens were also exhibited at
the Paris Exposition in 1878, and
some phosphate crystals, sent there
by a gentleman of Ottawa, were
eagerly bought up by English and
French merchants engaged or in-
terested in the manufacture of fer-
tilizers, and preserved by them as
rare curiosities; some of these crys-
tals weighed as much as 800 lbs.

In France, Spain, Norway, the
West Indian Islands and in South
Carolina, phosphate mining has
been carried on for many years.
Canada may now be added to this
list, her output for the past 5 years
having been as follows: in 1878,
3,701 tons; 1879, 11,927 tons;
1880, 7,974 tons; 1881, 15,601
tons, and in 1882, 17,181 tons.
These figures cover the entire out-
put from all parts of Canada where

phosphate is mined. The output of
the mines during the summer, and
of the mines being so situated as to
render delivery practicable at any
season of the year. This augurs
well for the future of Canada as a
phosphate producing country, and,
judging from the rapid progress
made during the past three years in
the development of the apatite de-
posits in the Ottawa Valley, there
remains little doubt that this
Dominion bids fair to become, at no
distant day, an important competi-
tor in supplying the markets of the
world with this valuable mineral.

The latest advices of the ruling
price offered for Canadian phosphate
in England quotes it at 1s. 4d. per
unit for 80 per cent. phosphate of
lime, with one-fifth of a penny rise
per unit for shipments overrunning
80 per cent. This, for 85 per cent.
mineral, would be equal to \$30 per
ton of 2,240 lbs.

The Coxheath Copper Mining
Company of Nova Scotia, composed
of Boston capitalists, has had
samples of ore assayed by two well
known assayists who report value
as follows, including a fair per cen-
tage of silver—No. 1, \$104.58, No.
2, \$106.90 per ton. It is now
stated that a regular output of ore
from the Coxheath mine has been
begun and that there will be no
difficulty in raising from fifteen to
twenty tons daily of 5 to 10 per
cent. ore.

N.B.—The *Austin Mine* on Echo
Lake is capable of a daily produc-
tion of from one hundred to one
hundred and fifty tons of ore, yield-
ing 10 to 12 per cent. of copper.
Surely this property should be a
mine of wealth to the stockholders
if mining operations were carried on
under proper management.

The contribution of Arizona to
the world's stock of the precious
metals from 1850 to the close of
1882 is approximately as follows:
Silver \$99,999,684, gold
\$9,566,527; making a total of \$38,266

May, 1883, no less than 100,000 visitors have been registered in the visitors' book, and among those may be seen the signatures of scientists, of men identified with mining pursuits, and of merchants and manufacturers from all parts of the globe. The average number of visitors is now about 50 daily, and during the past year there have been as many as 100, 150, and, on some special occasions, 300 names entered in the book in one day. It has been noticeable to those employed in the building, that a very large proportion of the people visiting the Museum manifest a marked preference to inspect the mineralogical collection, and to this much importance is attached, as it goes far to prove that the mineral wealth of Canada is becoming known the world over.

MINERALOGICAL NOTES.

The following is an extract from Mr. Small's pamphlet on the mineral resources of the Dominion of Canada:—

"The possession of metals is of vital importance to every country, and nature has been extremely prolific in giving Canada, in its varied geological functions, many of the ordinary metals and ores."

The attention of capitalists, both native and foreign, which has within the past few years been attracted thither, has had the effect of eliciting facts which prove, beyond a doubt, that Canada is destined, eventually, to rank among the finest mining districts in the world.

The impetus lately given to prospecting, by enquiries constantly being made, has caused the discovery of important deposits of economic minerals of vast extent, and of so varied and useful a character—the existence of which, in Canada, was previously unknown, or, at least, known only to the geologist and men of scientific pursuits—as in many cases, lead to

the mineral resources of this country become developed, its agricultural capabilities will be fully brought out, manufactures and commerce will increase, and a numerous and thriving population will find ready employment in the various branches of trade.

The chief minerals of economic importance enumerated in the Geological Survey Reports, as existing in Canada, may be thus classed:—

1. Metals and their ores.
2. Minerals applicable to chemical manufactures.
3. Minerals applicable to construction.
4. Minerals for grinding and polishing.
5. Minerals applicable to refraction.
6. Minerals applicable to the fine arts.
7. Minerals applicable to miscellaneous uses.

Metals and their ores.—Under this head are the following: Iron, which exists as bog ore, hematite, magnetic and specular ore, and magnetic iron sand; lead; copper, sulphurets and native; nickel and cobalt, zinc, silver, gold, platinum.

Minerals applicable to chemical manufactures.—Iron ores and chromic iron, sulphate of barytes, molybdenite, cobaltiferous and arsenical pyrites, bismuth, antimony, manganese dolomite, magnesite, phosphate of lime and calcareous tufa. Of the above, iron ores and sulphates of barytes, chromic iron, bismuth and others are used as pigments and in the manufacture of paints; molybdenite and manganese, for blacking and decolorizing; pyrites, for the manufacture of coppers, sulphur and sulphuric acid; dolomite and magnesite, for medicinal purposes; phosphate of lime and calcareous tufa, for artificial manures.

Minerals applicable to construction.—Under this head are limestones and sandstones, for building purposes, the former is also used to prepare lime and hydraulic cement; gneiss, syenite and granite, for paving purposes; marbles, found in great variety, white, black, red, veined, dark and light green, brown, grey, mottled, etc., for pillars, mantelpieces, and decorative purposes, and sculpture; slates, for

GENERAL INFORMATION

RESPECTING THE
MINES & MINING LAWS
OF THE
PROVINCE OF QUEBEC.

The chief provisions of the Quebec General Mining Act of 1880 are:

1. The declaration of ownership by the Crown and reserve of all mines not especially granted. Sec. 3.
2. For the sale of mining rights on unpatented lands acquired for agricultural purposes. Secs. 4 to 12.
3. For imposition of royalty under Order in Council, if deemed advisable. Secs. 13 and 52.
4. For granting licenses to mine for gold or silver on public lands, and on conceded portions of Seigniorie Rigaud, Vaudeuil and other private lands. Secs. 14, 50, et seq.
5. For the sale of lands as mining locations. Sec. 23, et seq.
6. For imposition of penalties for contravention of Act. Sec. 101, et seq.

Under this Act, parties holding letters patent for lands granted for agricultural purposes may acquire the right to work any mines of gold or silver thereon, without license, by paying the Commissioner of Crown Lands a sufficient sum to make up, with the amount paid before the issue of patent, the price of two dollars per acre. In the case of "free grants" the whole price of two dollars per acre must be paid. *Censitaires* in the seigniories in which the Crown holds mining rights may acquire these rights by paying one dollar and a half per acre for the whole of their land, or at least one hundred acres; and the seignior or proprietor of the unconceded portion of a seigniorie may do the same on paying two dollars per acre; the extent over which such rights can be acquired being, however, limited to four hundred acres, or in special cases, eight hundred acres.

If a mine of any kind be discovered and worked and sold for

but not patented, the duties not being payable, the sale may be cancelled and be paid for in full at the location. Sec. 12.

Locations, which may extend up to four hundred acres, or, in special cases, eight hundred acres, may be acquired by addressing a letter to the Commissioner of Crown Lands, specifying the lot or lots required, and transmitting at the same time:—

1. The full price of the location at the rate of *three dollars per acre* if it is to be mined for *phosphate lime* (this price was fixed by O. C. of 23rd of March, 1881); *two dollars per acre*, if to be mined for *asbestos or gold or silver* (price by O. C. of 7th Oct., 1881); *one dollar per acre*, if it is to be mined for *inferior metals or other minerals* or deposits of any substance of appreciable value.

2. A specimen of the mineral for which the land is to be worked with an affidavit identifying it, having been taken from the land applied for.

Mines of gold or silver on public or private lands may be worked by parties taking out licenses for themselves and employees, costing ten dollars for each person for three months, if the mining is to be done on private lands, and four dollars on public lands.

The size and position of claims on public lands worked under such licenses are regulated by the Act determined by the Mining Inspector according to circumstances.

The localities in the Province of Quebec in which minerals are chiefly found are as follows:—

GOLD.—Eastern Townships, specially the Counties of Beauce and Compton.

PHOSPHATE OF LIME.—Counties of Ottawa and Argenteuil.

ASBESTOS.—Counties of Megantic and Wolfe.

IRON.—Counties of Ottawa, Montcalm, St. Maurice, Champlain, Charlevoix and Saguenay.

COPPER.—Counties of Bagin, Megantic and Sherbrooke.

GALENA.—Counties of Ottawa (Lake Temiscamingue), Gaspé and Rimouski.

PLUMBAGO.—County of Ottawa.

MICA.—Counties of Berthier, Ottawa and Megantic.

During the past quarter of century British Columbia has been no insignificant contributor to the gold market of the world. Since 1858 up to the present time she has produced no less than \$46,000,000 worth of the precious metal. Besides this our Western Province on the Pacific Coast is conspicuous for her known natural wealth in anthracite and bituminous coal, iron and copper mines.

ING REGULATIONS.

DEPARTMENT OF THE INTERIOR,
DOMINION LANDS,

OTTAWA, 19TH APRIL, 1883.

ons to govern the disposal of Mineral
Lands other than Coal Lands.

These regulations shall be applicable to all Dominion Lands containing mines of gold, silver, bar, lead, tin, copper, iron, or mineral deposit of economic value, with the exception of coal. Any person may explore Dominion Lands not appropriated or reserved by Government for other purposes, and search therein, either by surface or subterranean prospecting, for mineral deposits, with a view to obtaining these regulations a mining location for the same.

A location for mining, except for iron, shall not exceed twenty acres in area.

Surface boundaries shall be marked by lines not more than four inches in length. Its length shall not be less than three times its breadth.

Boundaries beneath the surface shall be the vertical planes in the surface boundaries lie.

Any person having discovered a mineral deposit, and desiring to obtain a mining location, under these regulations, in order that he may work the same, shall, to entitle him to protection, proceed as follows:

1. He shall mark the location on the ground by placing at its four corners wooden posts, not less than four inches square, driven not less than eighteen inches into the ground, and showing that length above it. If the ground be too hard to admit of so driving the posts into it, he shall build about each of them to support it and keep in place, a cairn or mound of stones, at least three feet in diameter at the base, and eighteen inches high.

2. On the most north-easterly corner he must mark with a cutting of iron, or with red chalk, his name in full, the date of such marking, and the letters M.L. 1., to indicate that the post is a Mining Location, post No. 1. Proceeding to the most south-easterly post, all be marked M.L. 2, and his initials. Next, the most north-westerly post shall be marked 3, and with his initials; and the most north-westerly post shall be marked 4, with his initials and the letters M.L. 4. Furthermore, on one of the corners of each post, which face is in the planting thereof be directed toward the post which next to it in the order in which they are here named and numbered, shall be marked in figures the number of yards distance to such following post. If means of measurements are not available, distances to be so marked on

each of the posts may be those estimated.

(In this manner any subsequent prospector, informed of these regulations, will, on meeting any one of the posts, be enabled to follow them all round, from one to another, and avoid encroachment either in search or in marking out another location in the vicinity for himself.)

5. Having so marked out on the ground the location he desires, the claimant shall next, within sixty days thereafter, file with the local agent in the Dominion Land Office for the district in which the location is situated, a declaration on oath according to form A in the schedule to these Regulations (which may be sworn to before the said agent, or may have been previously sworn to before a Justice of the Peace or Commissioner) setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as aforesaid; and shall, along with such declaration, deposit with the agent the sum of fifty dollars to the end and for the purpose set forth in the second clause hereafter.

6. The Agent shall give him a receipt, according to form B in the schedule to these Regulations, for such deposit. This receipt shall authorize the applicant, his legal representatives or assigns, to enter into possession of the location applied for, and during the term of one year from its date and subject to the royalty prescribed in clause 19 of these Regulations, to take therefrom and dispose of any mineral deposit contained within its boundaries.

7. The deposit of fifty dollars shall be paid into the Receiver General by the Land Agent, along with and in like manner as other revenue from Dominion Lands in his district, and in the event of the mining applicant fulfilling all the conditions prescribed by these Regulations, the said deposit shall be deemed payment by him to the Government for the survey of his location.

8. At any time before the expiry of one year from the date of his making his application and deposit as aforesaid, it shall be open to the applicant to purchase the location on filing with the Local Agent proof that he has expended not less than five hundred dollars in bona fide mining operations on the same, such proof to consist of his own sworn statement setting forth in detail the nature of such operations and the amount expended, and to be accompanied and confirmed by the affidavits of two disinterested persons.

9. Should the applicant, or his legal representatives as aforesaid, fail to prove within one year, the expenditure prescribed, or having proved such expenditure, fail within that time to pay in full, and in cash, to the Local Agent, the price hereinafter fixed for such mining loca-

tion, then any right on the part of the applicant or of his legal representatives in the location, or claim on his or their part to acquire it, shall lapse; and the location shall thereupon revert to the Government and shall be held along with any immovable improvements thereon for disposal, under these Regulations, to any other person, or as the Minister of the Interior may direct, and the deposit paid by the applicant shall be forfeited to the Crown.

10. The price to be paid for a mining location shall be at the rate of twenty-five dollars per acre.

11. If, on account of its remoteness or other cause, a mining location cannot, at the time of the payment of the deposit of fifty dollars by the applicant for the purpose, be surveyed by the Government for that sum, he shall be subject to the alternative of waiting until the employment of a surveyor by the Government on other work in the vicinity of the claim renders it possible to have the survey made at a cost not exceeding fifty dollars, or of sooner procuring at his own cost its survey by a duly commissioned surveyor of Dominion Lands, under instructions from the Surveyor General; in the latter case, on receipt of the plans and field notes of the survey, and approval thereof by the Surveyor General, the claimant shall be credited on account of royalty due, or to become due, with the fifty dollars deposited by him to defray cost of survey.

12. Where two or more persons lay claim to the same mining location, the right to acquire it shall be in him who can prove he was the first to discover the mineral deposits involved, and to take possession by demarcation, in the manner prescribed in these regulations, of the location covering it.

13. Priority of discovery alone shall not give the right to acquire; but a person subsequently and independently discovering, who has complied with the other conditions prescribed in these regulations, shall take precedence of the first discoverer if the latter has failed to comply with the said other conditions. Provided, however, that in any case where it is proved that a claimant has in bad faith used the prior discovery of another and fraudulently affirms that he made independent discovery and demarcation, he shall, apart from any other legal consequences, have no claim, and shall forfeit the deposit made with his application.

14. Not more than one mining location shall be granted to any individual applicant.

15. The Minister of the Interior may grant a location for the mining of iron not exceeding 160 acres in area. Provided that, should any person making an application purporting to be for the purpose of mining iron, and thus obtain, whether in good faith or fraudulently, possession of a valuable

mineral deposit other than iron, his right in such deposit shall be restricted to the area hereinbefore prescribed for other minerals, and the rest of the location shall thereupon revert to the Government for such disposition as the Minister of the Interior may direct.

16. When there are two or more applicants for any mining location, no one of whom is the original discoverer, nor his assignee, the Minister of the Interior, if he sees fit to dispose of the location, shall invite their competitive tender, or shall put it up to public tender or auction, as he may deem expedient.

17. An assignment of the right of an original discoverer to purchase a mining location shall be endorsed on the back of the receipt or certificate of assignment (Forms B and C in the schedule hereto), and the execution thereof shall be attested by two disinterested witnesses; upon the deposit of the receipt or certificate with such assignment executed and attested as herein provided, in the office of the Local Agent, accompanied by a registration fee of two dollars, the Local Agent shall give to the assignee a receipt in the form C in the schedule hereto, which certificate shall entitle the assignee to all the rights and privileges of the original discoverer in respect of the claim assigned; and the said assignment, with the registration fee of two dollars, shall be forwarded to the Minister of the Interior by the Local Agent, at the same time and in like manner as his other returns respecting Dominion Lands, and shall be registered in the Department of the Interior; and no assignment of the right of an original discoverer to purchase a mining location which is not unconditional and in all respects in accordance with the provisions of this clause, and accompanied by the registration fee herein provided for, shall be recognized by the Local Agent or registered in the Department of the Interior.

18. If application be made under the next preceding clause, by the assignee of an original discoverer, to purchase a mining location, and such claim is duly recognized and registered, as hereinbefore provided, such assignee shall, by complying with all the provisions of clause 8, become entitled to purchase the location for the price and on the terms prescribed in these regulations, whether or not his assignor may have previously acquired a mining location under them.

19. The patent for a mining location shall reserve to the Crown, for ever, a royalty of five per cent. on the sales of the products of all mines therein; and also on the sales of any timber or wood that may be on the location.

20. Returns shall be made by the grantee sworn to by him, or by his agent or other employee in charge of the mine, at monthly or such other intervals as may be re-

(Continued on 6th Page.)

MINERALS IN CANADA.

An article has appeared in the *Liverpool Journal of Commerce* commenting on the mineral wealth of Canada as follows:—"Much interest has of late been created amongst capitalists in consequence of the extraordinary development of mining in Canada: and, in connection therewith, it may be well to observe that in the neighbourhood of Ottawa, the Capital of the Dominion, the amount of enterprise displayed, especially in the Laurentian range of mountains, is something enormous. For the past two or three years parties of workmen have been engaged in removing phosphates from what are known as "surface pockets," the prevailing opinion amongst geologists having been that this valuable mineral was only to be found under certain conditions. The experience of those engaged in the operations referred to throws fresh light on the entire subject, and, in contra-distinction to the learned *dicta* of men of science, it is found that the mineral is obtainable under conditions which present no appearance whatever of animal organization. Further, it is obtainable in such quantities, and of so high a quality—the latter giving 85 per cent. of phosphate of lime—as to yield a large revenue. It has been ascertained, likewise, that these "pockets," when blasted, expose extensive and unexpected deposits of phosphate beneath. The consequence of these disclosures has been much excitement, not only in Ottawa, but throughout the Dominion, and phosphate lands have experienced a rise in value. It is noteworthy, too, that not only American, but English, French and Belgian capitalists are investing largely in these lands, a strong testimony to the value in which they are held beyond Canada itself.

In further illustration of the mineral wealth of the country, we may mention that on the Island of Michipacotin there has been disclosed an enormous deposit of copper, which far exceeds the deposits of the Calumet and Aecle Mining Company, so well known in the United States. Specimens of the newly-discovered ore have been forwarded to the laboratory of the School of Mines in London, and the analysis has proved, in connection with the known extent of the deposit, that a valuable industry of unheard of dimensions is about to be opened up. A large capitalist from London has sailed in one of the Allan steamships, with a view of testing the accuracy of the reports that have reached this country as to mining development in Canada—a practical method of going to work, which should tend to foster legitimate trade and nip any bogus experiments in the bud. Assuming these reports to be, in the main, correct, Canada is certain, as regards the mining industry, to have a bright future: and, with the in-

terest manifested in all Canadian matters by the Marquis of Lorne, should have the effect of promoting still further commercial intercourse between it and the Mother Country."

It cannot fail to please the people of Canada, more particularly those interested in mining enterprises, to read such flattering articles in the foreign press on the vast natural wealth this country possesses.

Manitoba Mines.

It must be encouraging to those directly interested in the welfare of Manitoba to notice how rapidly the mineral wealth of that province is being developed. Not a day passes that we do not see leading articles in the Canadian and American press commenting on the gold mines of Manitoba, and all testifying in unqualified terms to the richness of the mines at present in operation. Prominently among these is the well-known Keewatin Mine, situated near the Lake of the Woods, about 500 feet from its shore. The shaft has been opened on the crest of a ridge, about 80 feet above the lake level, and is being sunk in a true fissure vein, with most encouraging results, the quartz increasing in richness as mining progresses, until the company has now the satisfaction of claiming, and justly so, that the ore taken from its mine gives a larger percentage of the precious metal than any other yet discovered in the district; and, compared with the principal gold mines of the United States, its yield is far in excess, as the following figures will show:—

Manitoba Mines.

Keewatin Mine, per ton of 2,000 lbs. . .	\$171 50
Lake Winnipeg " " 	124 00
Hay Island " " 	151 00
North American " " 	81 25

United States Mines.

	Per ton
Bodie Consolidated Mine..California...	\$74 78
Keystone Mine.....Georgia.....	36 00
Moneton ".....Montana.....	40 00
Penobscot ".....Dakota.....	5 to 6
Robinson ".....Colorado.....	50 00
Silver Bond ".....Montana.....	40 00
Tecumseh ".....Utah.....	30 00
The West ".....S. Carolina.....	10 00

From this it will be seen that the flattering reports published regarding the value of the "Keewatin," have not been without substantial foundation, and taking into account the many important advantages this mine possesses, such as being easy of access, the cheapness of fuel and the richness of its ore, it may safely be predicted that the company has in store a brilliant and a prosperous future.

Some gentlemen from the United States who have a large amount of capital invested in mines in New Mexico and Nevada, accompanied by mining experts from New York, recently visited the property of the Keewatin Mining Company, and were unanimous in the opinion that the lode was much richer and promised a larger yield than anything they had seen in Colorado or Nevada. To the opinions of these practical and, in such matters, well informed men, should be attached much importance; time, however,

will prove the correctness or incorrectness of their reports. If mining operations are prosecuted with the same energy in the future, and with the same encouraging results as have been shown in the past, this company will realize such prosperity as will exceed the most sanguine anticipations of those who are interested in its welfare. If, when the output of ore has been crushed, the result bears out the tests already made on a small scale, and there is little doubt but it will, then, it is safe to say, success will have been assured for the Keewatin Mining Company and a lively "boom" will thus be created in Manitoba mining stocks. There will be no further necessity for applying to men of capital for assistance—on the contrary, capitalists will anxiously seek investment for their money in what promises to return such handsome profits.

A Gold Brick.

A despatch recently received from Winnipeg announces the arrival in that city of a gold brick weighing 3 lbs. It was brought from the Winnipeg Consolidated Mine, and has created intense excitement among those interested in Manitoba gold mines. Another brick is looked for, and should have reached Winnipeg ere this, from the Argyle Mine. The mills at both these mines are said to be doing excellent work, and the value of the properties is established beyond a peradventure.

Keewatin Mine.

A telegram was received from New York a short time since by a gentleman in Winnipeg, asking him if the Keewatin Mining Company would be disposed to sell 5,000 shares of its stock at \$8 per share. If this offer be accepted, it will be the largest sale of Keewatin stock yet effected; its par value is \$10 per share.

**Incorporated Mining Companies
in Manitoba.**

The following is a list of the Gold Mining Companies owning properties on the Lake of the Woods, the capital stock of each, and the par value of their shares :

	Capital Stock.	Shares par value
Argyle Mining Co., limited.	\$1,000,000	\$100
Winnipeg Consolidated Gold Mining Co., limited.	1,020,000	50
Keewatin Mining Co., limited.	1,000,000	10
Lake of the Woods Gold Min- ing Co.	2,000,000	20
George Heenan Mining Co.	500,000	10
Lake Winnipeg Mining Co.	2,000,000	10
Mining Investment Co.	300,000	
Canada Gold Mining Co., limited.	1,000,000	20
British American Gold Min- ing Co.	500,000	10

The greater number of the above named companies are already engaged in active operations, and mining is being vigorously pushed ahead.

A careful estimate, by States, of the silver product of Mexico, shows an annual yield of \$22,000,000.

Manitoba Lands.

We beg to direct the attention of our readers to the list of Birtle Lands in Manitoba, published in another column for The selection of these land made by an old resident of the country, who reports rich black soil with gravel sub-soil, and plenty of water. The Portage and Huron Railway—now in construction—will run through the heart of the Birtle district. More beautiful country exists in the British possessions than the Red and Bird Tail Section of Manitoba and we venture to say that, in the next five years, lands of the same quality as those offered for sale will be difficult to obtain at \$50 to \$100 per acre.

ASBESTOS.

This valuable mineral is found more or less in various of Canada. It occurs in the s lying north of Kingston an many sections adjacent to the tawa Valley, but the deposit covered in these localities have yet been worked, and this is due to the want, on the part of the owners, of the necessary means to carry on mining operations, as to the fact that the existence of the mineral in this section of Ontario is comparatively unknown to the general public. Yet the opinion prevails amongst geologists that the north of asbestos in the Ottawa Valley is destined to become an industry of great importance. In the Elfrink Townships it has already become the most important industry, a large quantity of mineral shipped from the mines in the County of Mecklenburg has been annually increasing, and it is rapidly becoming one of the most extensive asbestos producing sections of North America. In the Township of Shefford, mining operations are being actively carried on by the Boston Asbestos Paper Company, by Messrs. King and by Messrs. Johnston and V. Four distinct properties are now worked by these gentlemen, who employ in all 160 men, and the daily output is estimated at 700 tons. Mr. Jeffery has for some years been engaged in mining in the Township of Danville, and has succeeded in raising a large amount of mineral all of which has been shipped to Mr. W. H. Johns, of New York, one of the largest Fire-proof Roofing Paint and Packing Manufacturers in the United States. Mr. Wright's mine, in Wolfston, is said to yield 20 tons daily, and by the employment of additional force the output might be considerably increased. This, however, has, as yet, been but recently opened and it is only reasonably supposed that it will become as productive as development progresses. In the Township of Broughton, Dr. J. Reed is giving some attention to mining, and the mine now operated by him bids fair to develop into a very valuable

property. The asbestos produced from these mines in the County of Megantic, is similar to that found in the Ottawa Valley, and is pronounced by European manufacturers the finest and strongest fibre of the kind known. On Lot No. 11, in the 8th Range of the Township of Templeton, in the County of Ottawa, a valuable asbestos mine has been opened and a quantity of mineral shipped, but, owing to the owner's inability to continue mining operations, the property is offered for sale, as will be seen by an advertisement in another column. Most favourable reports have been received of this property, and there exists little doubt that it will develop into one of great value.

PERSONAL.

Mr. J. G. Miller, who has for many years been identified with phosphate mining in Canada, was in Ottawa recently. Mr. Miller has devoted a great deal of time and study to this industry, and was instrumental in attracting the attention of the outside world to the value of our Canadian apatite deposits. For the past two years he has been actively engaged in guano mining on an island near Porto Rico, and was in Ottawa *en route* to Liverpool, where he hoped to procure direct tonnage from the island for his output by effecting such arrangements with ship-owners as would allow vessels carrying cargo to American ports to return laden with guano for the English market. As the uncertainty of transportation has thus far retarded his operations, and has been a serious drawback, it is to be hoped he may accomplish the object of his mission.

Mr. W. McIntosh, Manager of the High Rock Phosphate Mine, was in the city within the past few days, and expressed himself more than satisfied with the way in which the work under his supervision is progressing. Mr. McIntosh has been engaged for some years in this business, and has forwarded many thousand tons of mineral across the Atlantic; this season he will ship more than in any previous year, and yet he speaks of phosphate mining in Canada as being in its infancy.

Captain J. E. Smith, of the "Union Phosphate Land and Mining Co.," reports that work is progressing most favourably at the mine. The property owned by this company adjoins the "High Rock Mine," in the Township of Portland, West, and is said to be very rich in mineral. The company, composed of capitalists in New York, Philadelphia, Detroit, Chicago, Cincinnati, and Kansas City, has a capital stock of \$1,000,000, divided into 10,000 shares, fully paid up and unassessable. A large force of men are employed at the mine, and the most

modern machinery has been erected to facilitate the rapid prosecution of work. Captain Smith, the company's superintendent, when last in Ottawa, is reported to have said that, since the company began operations, the immediate vicinity of the mine has undergone a great change. What was but a few months ago a wilderness, is now the scene of life and activity; and, where no habitation was visible, a village of no mean proportions has suddenly appeared. The superintendent will no doubt ship a large quantity of high-grade phosphate from the mine this year.

Mr. Weston, of the firm of Van Rensselaer, Falding & Co., of New York, was in Ottawa a few days ago. This firm has entered into contract with the Dominion Phosphate Company to raise a large amount of first quality phosphate from a property purchased last year by the said company from Mr. W. A. Allan, of this city. The mine is one of great value, and the mineral already mined has proved to be of the richest grade. Mr. Weston speaks very highly of the property, and is more than sanguine that the output for the year will be in excess of the quantity contracted for by his firm. Steam drills and derricks are kept busy penetrating into the bowels of the mountain towards the main body of ore. A cut is being made across the hill, 40 feet deep by 10 feet in width, so as to facilitate the working of a large force, and, in making this opening, many fine veins, leading to the main deposit, have been crossed, and a large amount taken therefrom. Mr. Weston reports a great quantity of phosphate in sight, and says that the company contemplates constructing a tramway from the mine to the Rivière du Lièvre to render practicable the shipping of the output during the summer season. Phosphate mining in the County of Ottawa is certainly making rapid strides.

MICA.

In Canada, up to the present time, little or no attention has been directed to this useful and valuable article of commerce. Throughout the Laurentian range large quantities of mica are to be seen on the surface of the rocks, and, wherever mining or quarrying has been carried on, abundance of it is to be met with, but in most instances it is unmarketable. In the majority of cases it is associated with a limestone formation, and this is pronounced to be of no commercial value. In some localities, however, in the Ottawa Valley, it occurs in regular veins, lying between well defined walls of feldspar and quartz, and in others the veins are hemmed in by granite. The mica found in these formations is of a very superior quality and, in clearness and size of the sheets, it is equal to that imported from North Carolina and

New Hampshire. From some such veins, not far distant from the City of Ottawa, a quantity has been extracted and forwarded to different firms in the United States, who have attested to its value and pronounced it equally clear and perfect as any they had before used. It is to be hoped that, at an early day, Canadian mica will be sought after by stove manufacturers and others, and that the same activity will be shown in the mining of this mineral as is evinced by those engaged in working the phosphate and other deposits.

IRON.

There is no metal of so much importance in the material progress and prosperity of any country as iron, and it is to be found in great abundance and variety in all the provinces of the Dominion of Canada. The iron deposits of Eastern Ontario and the western portion of the Province of Quebec are especially noteworthy, as they are destined, at no distant day, to attract the attention of capitalists from all parts of the world. There are to be found, in every direction throughout this part of Canada, strong indications of the presence of the metal, and many veins of magnetic and hematite ore have been opened to a small extent by prospectors and owners of properties for the purpose, merely, of establishing the fact of its existence in paying quantities, and of procuring specimens for analysis. In nearly all cases the result of assays has proved the ore to be of unquestionable richness, without deleterious properties common to that in many other localities; to be comparatively free from impurities, and the presence of titanium is almost imperceptible. In the Township of Hull, in the County of Ottawa, extensive deposits of hematite ore have been exposed; and one mine of magnetic ore, yielding as high as 66 per cent. of metallic iron, has been actively worked for some years, and the ore shipped at small cost to Cleveland, Ohio. In that section of Eastern Ontario lying north of Kingston and Belleville, between Lake Ontario and the waters of the Upper Ottawa, an abundance of iron ore is to be found, occurring chiefly in the Townships of Marmora, Hastings, Tudor, Madoc, Bedford and Bagot; in the last named township the ore is said to yield a high percentage of metal, and to be of marked purity. In some of the other townships the mines have been more or less operated, and the output shipped to the United States to be smelted. In Bagot, however, the deposits have not yet been worked for shipping, owing to their having been isolated from railway and water communication, and to the difficulty of access heretofore encountered; this drawback has, however, been removed by the construction

Pembroke Railway, which now traverses that section of the country, affording easy access to the mines, and means of transporting the ore—that is to say, if property owners continue to ship the output in its raw state to American smelting works; but the Canadian Government is alive to the importance of encouraging home manufacture of iron, and, as an inducement to miners in the country to do so, Sir Leonard Tilley, in his Budget speech, delivered in the House of Commons on the 30th of March, said: "the Government will submit a resolution to the Committee, that on and after the 1st July next, and for 3 years, \$1.50 per ton will be paid on all pig-iron produced in Canada during those 3 years, and \$1.00 per ton during the next 3 years, as a bounty for the encouragement and development of this industry."

The bounty mentioned for the 3 years from the 1st July (\$1.50 per ton) should be ample to defray the cost of mining, and to go towards paying for fuel as well. This should be sufficient to induce capitalists in the Dominion to inaugurate this new enterprise, and, if due advantage be taken of the Government's liberal offer, it will have the effect of bringing Canada prominently among the extensive iron-producing countries of the world.

PROJECTED RAILWAYS.

The inhabitants of those sections of the Province of Quebec adjacent to the Rivers Gatineau and Du Lièvre are much exercised at the prospect of having, within a short time, railway communication from the interior to the line of the Canadian Pacific and the Ottawa River. The surveys have already been made for the Ottawa and Gatineau Valley Railway, and for the Ottawa Colonization Railway, and it is expected that the work of construction on both roads will be begun in the near future and strenuously pushed to completion. The line of the first mentioned road has been located from Hull to a point 80 miles north, and throughout the entire distance no serious engineering difficulties have been encountered; for many miles it traverses a cleared and well cultivated country, and then enters the timber and mineral district of the Gatineau Valley. The Ottawa Colonization Railway, starting from Buckingham, will pass through open country for some distance, and, running west, will penetrate into the very heart of the phosphate region, thus affording rapid means for shipping ore at all seasons of the year. A very fair location for this line has been adopted, and the breaking of ground is looked for with no little interest by those engaged in lumbering and

Dept. of Railways the townships continuing the proposed route.
Ottawa, 21st

quired by the Minister of the Interior, of all products of his mining location, and of the price or amount he received for the same.

21. The Minister of the Interior may direct mining locations to be laid out wherever, from report of the Director of the Geological Survey or from other information, he has reason to believe there are mineral deposits of economic value, and may sell the same to applicants therefor, who, in his opinion, are able and intend in good faith to work the same; or he may, from time to time, cause the said locations to be sold by public auction or tender. Such sales shall be for cash, and at prices in no case lower than those prescribed for locations sold to original discoverers, and shall otherwise be subject to all the provisions of these regulations.

LINDSAY RUSSELL,

Deputy of the Minister of the Interior.

SCHEDULE TO MINING REGULATIONS.

FORM A.—DISCOVERER'S APPLICATION AND AFFIDAVIT.

I, (A.B.) of hereby apply, under the Dominion Lands Regulations, for a Mining Location in (here give general description of locality)

for the purpose of mining for (here name the metal or mineral) and I hereby solemnly swear:—

1. That I have discovered therein a deposit of (here name the metal or mineral)

2. That I am to the best of my knowledge and belief the first discoverer of the said deposit.

3. That I am unaware that the land is other than vacant Dominion Lands.

4. That I did, on the day of mark out on the ground, in accordance in every particular with the provisions of clause four of said Mining Regulations, the location for which I make this application; and that in so doing I did not encroach on any mining location previously laid out by any other person.

5. That the said mining location contains, as nearly as I could measure or estimate, an area of acres, and that the description (and sketch, if any,) of this date hereto attached, signed by me, set forth in detail to the best of my knowledge and ability its position, form and dimensions.

6. That I make this application in good faith to acquire the land for the sole purpose of mining to be prosecuted by myself, or by myself and associates, or by my assigns.

Subscribed before me } (Signature)

FORM B.—RECEIPT FOR DEPOSIT BY APPLICANT FOR MINING LOCATION.

No.

Department of the Interior,
Dominion Lands Office,
Agency 18

Received from (A.B.) of Fifty Dollars, being payment by him of the deposit required by Clause five of the Dominion Lands Mining Regulations accompanying his application No. , dated 18 for a Mining Location in (insert general description of locality).

This receipt authorizes the said (A.B.) his legal representatives or assigns, to enter into possession of the said Mining Location, and during the term of one year from the date of this receipt, and subject to the royalty prescribed in Clause nineteen of Mining Regulations, to take therefrom and dispose of any mineral deposit contained within its boundaries, and on due compliance at any time within that period with the several requirements in that behalf of the said Mining Regulations, entitles him or them to purchase the said location which, provisionally, and until survey thereof, may be known and described as follows: (Insert description in detail).

If the said A.B., or his legal representatives or assigns, fail to comply, as aforesaid, with the conditions that would entitle them to purchase within one year from this date, or, having so complied, do not within that time make payment in full for the land, then the right to purchase shall lapse, and the Mining Location shall revert to the Government, to be otherwise disposed of as may be directed by the Minister of the Interior.

Agent of Dominion Lands.

FORM C.—CERTIFICATE OF THE ASSIGNMENT OF A MINING LOCATION.

No.

Department of the Interior,
Dominion Lands Office,
Agency 18

This is to certify that (B. C.) of has filed an assignment in due form, dated 18, and accompanied by

a registration fee of two dollars, of the right of (A. B.) of to purchase the mining location in

(here insert general description of locality) applied for by the said A.B. on the 18

This certificate entitles the said B.C., or his legal representatives or assigns, to all the rights and privileges of the original discoverer, A.B., in respect of the claim assigned and hereinafter described; that is to say, to enter into possession of the said mining location, and during the term of one year from the date of the receipt No. . . . , granted to the day of subject to the

royalty prescribed in Clause nineteen of the Mining Regulations, to take therefrom and dispose of any mineral deposit contained within its boundaries, and on due compliance at any time within that period with the several requirements in that behalf of the said Mining Regulations, entitles him or them to purchase the said Location, which provisionally, and until survey thereof, may be known and described as follows:— (Insert description in detail).

If the said B.C., or his legal representatives or assigns, fail to comply as aforesaid with the conditions that would entitle them to purchase within one year of the date of the receipt granted to A.B., and now deposited with me, or, having so complied, do not within that time make payment in full for the land, then the right to purchase shall lapse, and the Mining Location shall revert to the Government to be otherwise disposed of as may be directed by the Minister of the Interior.

Agent of Dominion Lands.

COAL.

That coal does not exist in Ontario or Quebec, owing to the geological formation of these Provinces, is an established fact; but being favourably situated in there proximity at all points to other carboniferous regions, and the facility of conveyance afforded by the vast lakes, rivers, canals and railways of the respective provinces, it is easily procurable, and the deficiency is well made up by the vast areas of coal district in the Maritime Provinces and on the Pacific Coast. It is a most important matter for Great Britain to hold on either side of her possessions in this continent, countries possessing this valuable mineral on the coast, the eastern and western portals of the Dominion.

NOVA SCOTIA.—It is probable that Nova Scotia, in proportion to its extent, stands unrivalled in the productive capabilities of its coal fields, whilst nature has afforded every facility for working them to advantage. The coal belongs entirely to the bituminous division, no anthracite having been met with as yet, although there are numerous tracts of carboniferous formation in various parts of the Province; the largest and most valuable are situated near and along its northern shores, and over a considerable portion of the northern and eastern shores of Cape Breton. The chief coal producing sections of the Province are known as *The Sydney, The Inverness, The Richmond, The Antigonish, The Pictou, and The Cumberland Coal Fields.* The most productive of these is the Sydney Coal Field which furnishes coal particularly suited for gas making, and certificates from the English mercantile navy prove it almost

equal to Welsh Steam Coal. The enormous amount of available coal it contains is stated in the Geological Survey Reports to be over 212,000,000 tons. The cost of the coal mined and put on board the cars varies at the different collieries from 60 cents to \$1.25 per ton.

NEW BRUNSWICK.—The only locality in this Province where coal mining operations are at present conducted is in and about the Newcastle River and the shores of the Grand Lake, in Queen's County. The area and thickness of the beds indicate a total productive capacity of 155,000,000 tons, and it may fairly be presumed that with economical management, and a proper system of working, a large portion of this enormous quantity might be profitably extracted. The coal is a true bituminous, is employed both for household and blacksmiths' use, and is said to be of good quality. In Albert County a remarkable mineral known as Albertite was discovered about the year 1850, and since then nearly 200,000 tons of this mineral has been removed and exported to the United States for the manufacture of oil and for the admixture with other coals in the preparation of illuminating gas, for either of which purposes it is admirably adapted, being capable of yielding 100 gallons of crude oil, or 14,500 cubic feet of gas, of superior illuminating power, per ton.

BRITISH COLUMBIA.—The presence of good coal in Vancouver Island and the absence of it in other portions of the Pacific Coast, are greatly in favour of this Province. The coal bearing localities of British Columbia are *Queen Charlotte Island, Vancouver Island, and the Mainland.* The production is increasing with the demand, and, in view of a growing market, works are being freely extended. The output sells at the mines for \$5 to \$6, and in San Francisco for \$10 per ton. The existence of a fine quality of coal on the seaboard cannot fail to be of the very greatest importance when the Canadian Pacific Railway converts British Columbia into one of the world's highways. By that time all the trans-continental railways will connect on the Pacific Coast with lines of coasting and ocean steamers, which will get steam coal from the only North Pacific district that can supply it, namely, Vancouver Island. Dr. Brown, of Edinburgh, who visited the province some years ago, says, "that, in her coal fields, British Columbia has within herself the elements of lasting prosperity," and this cannot be denied.

NORTH-WEST TERRITORY.—it is now an established fact that coal exists in various districts of this vast territory, and it has been discovered in large quantity in the following localities, namely, on the east coast of Hudson Bay and some miles inland from Little Whale

er; on Abitibi and Missinaibi
ers; on the west bank of Coal
k, and at the mouth of Poplar
er; and near Rocky Moun-
House, and between that site
Edmonton; in the region west
Edmonton lying between the
abasca and Red Deer Rivers,
in the Souris district. The
scarcity and low quality of
timber over hundreds of miles
country bordering the two Sas-
sawan Rivers render it a
er of the very greatest impor-
e, in connection with the future
ement of the North-West, and
pening it up either by land or
steam transport, to ascertain
e and at what depth coal can
ocured available for domestic
oses, railroads and steamboats.
etermine this, borings must be
e, as surface examinations will
olve the question.

The recent discovery of coal in
Souris district will prove of in-
valuable value to Manitoba and
country surrounding, and will
be of the most valuable adjuncts
to prosperity and progress of
North-West.

GRATUITOUS ADVICE.

Advantage might be taken by
dians of the advice conveyed
in article which appeared not
since in the *Chicago Journal*
commerce, addressed to grum-
as follows:—

is hardly understood why a few
in this country have so suddenly
become rich. It is because the country
is bling in value every ten years, and
men happen to be in possession of
main arteries of trade and manufac-
and so the land of every town
is in value, so does the railroad and
graph right of way double each ten
and will continue to do so until
country is fully occupied. Every foot
in the North-West, every railroad
telegraph and manufactory will be
double in 1890 what it was in
1880. Only get hold of as much as pos-
sible of the material of this country and
it. If the grumblers would do this
instead of finding fault with owners of
lands because their property doubles
doubles again in value! Opening
and building railroads is not al-
ways a sure road to wealth, but the mines
chance to be bonanzas and the
which chance to be the great high-
will give their holders fortune.
don't stop to grumble!"

TRUE COURAGE.

BY KATE WINDSOR.

ough frame cabin on the bank of a
the mining regions. A dozen men
eaten on the unplanned benches
d the interior, and two girls stand
tful attitude at the doorway. Out-
the banksmen are dexterously load-
the carriage with timber for use in
mine. Until they have completed
labours the operatives cannot go to
respective stalls. All of them ex-
the distinguishing marks of their
g, and many of them bear on their
faces the faint blue lines which tell
of frequent story of perils in the mine.

The delay is tedious to men accus-
tomed, as they are, to severe physical
toil, and a veteran with grizzled looks
and beard, who is evidently recognized
by the others as a leader, suggests that
one of the girls be sent for "drink."

The suggestion is approved by all
with one exception, and this man, John
Walters, remains silent.

The girl has not far to go, and she
quickly returns with a can of the beverage.
Richard Wilson, one of those who
had most heartily assented to the
proposition, takes the can from the girl
and proceeds to dispense the contents.
He approaches Walters in turn and
proffers the brimming glass, but the in-
vitation is declined with thanks.

"So you won't drink, mate?"

"No, Dick; I can't do it."

"You are too partickler, mate; per-
haps it's the company you objects to?"

"You know me better, Dick; don't
press me."

"You had better drink, mate," says
Dick, with an evil gleam in his eyes.

"I've already told you that I don't
want it," is the steady answer.

"Well, take it that way,"—and the
beer is violently dashed in Walters' face.

The man who is so grossly insulted
turns a shade paler as he clenches his
teeth hard to restrain the rising passion,
but he says nothing, and a howl of
derision is raised by his fellow workmen.

"Why, you cur," shouts one; "defend
yourself; a worm will turn if trodden
on."

"Jack Hardy," responds Walters;
"you have worked in the next stall to
me for over a year. We have seen some
trouble in our heading—can you say
that I have ever shown the white
feather?"

"You're doing it now," is the quick
and contemptuous retort.

"I object to fight on principle, and
you know it," calmly replies Walters;
and the appearance of the "boss" is
the signal for closing the discussion.

The foreman reports the workings
clear of gas; the lamps are locked, and
the miners are quickly engaged in filling
their tubs with the "black diamonds."

In the breast of John Walters various
emotions are contending for the mas-
tery. He is a sensitive man and the in-
sult is keenly felt. The struggle is a
sharp one, but the cloud lifting from his
brow shows that he has conquered. He
remembers the time when he drank
harder, and for a longer period at a
stretch, than any of his mates. He re-
members the wretched tenement, almost
devoid of furniture, which in those days
he called his home; and he thinks of
wife and children often hungry and
always thinly clad.

All this is changed now. Not one of
his fellows has a happier family or a bet-
ter appointed home than himself, and all
has been accomplished by total abstin-
ence. By God's grace, he has told him-
self, he would never fall again—and,
although sorely tempted, he never has.

"Hark!"

It is one of the banksmen who is
speaking to his companion. The sound
which causes the exclamation is heard
again, and both men throw themselves
flat on the ground and endeavor to pen-
etrate the inky blackness of the shaft.
There is a strange and unaccountable
stillness below, which is soon broken,
however, by a dull rumbling sound re-
echoing through the chambers and road-
ways of the mine, and the men hold
their breath in the intensity of their ex-
citement. The carriage is at the top,
and one of them arises and hastens to
give the signal to "lower away."

Clang, clang, clang!

The massive hammer has fallen three
times in succession.

"They want to come up; there is

trouble below," says the agent, who has
just reached the bank from the office.

"And death!" answers the leading
banksmen, solemnly.

The carriage is lowered with light-
ning-like rapidity; is raised and its
living freight discharged. Again and
again the operation is repeated, and a
crowd of women and children are by
by this time congregated at the pit's
mouth. They peer anxiously into the
faces of those brought to the surface,
hoping for the best but fearing the
worst. Disfigured features are seen in
every load, and suffering is gauged by
groans of anguish.

"How many were in the pit?" asked
the agent in a voice which tells of
strong emotion.

"One hundred and twenty," is the
prompt answer.

"Then they are not all up?"

"No, sir; the men in No. 4 heading
are still below."

"I fear they are doomed, but an effort
must be made to save them—who goes
with me?" and the agent jumps into the
carriage with a nervous bound.

The example is quickly followed by
several others, but there is no enthusiasm
—only a grim determination to do their
whole duty, though it takes them into
the very jaws of death.

A narrow pathway winding down the
mountain's side. The herbage is scanty,
and yawning fissures and whitened
stones bespeak the frequent torrent. A
solitary goat browses on the slope, and
naught beside, save the tall black der-
rick which rears its head in the distance,
tells of life. The silence is broken by
the tolling of a bell in the tower of the
village church, and soon the pathway is
treaded by a procession of stalwart men
and weeping women. On the shoulders
of the men is borne all that is mortal of
John Walters, the "cur," who has laid
down his life on the altar of love.

The man who has treated him with
insult and contumely was in imminent
danger, for the explosion had come from
his stall, and Walters resolved, if possi-
ble, to save him. Half choked with the
after-damp, he toiled onward through
the subterranean passages until he came
to Wilson's working place. Large por-
tions of the roof had fallen, and it was
necessary to proceed on his hands and
knees. He did not hesitate, but, with a
heart-prayer for success, he boldly en-
tered.

Groping around with his hands out-
spread, they presently came in contact
with the apparent lifeless body, and in
bent posture he retreated—slowly,
laboriously, and painfully.

Once on the roadway, he sought for a
sign of life and found it. The pulsation
of Wilson's heart was perceptible, and it
nerved the gallant fellow to increased
effort.

But at last he sank to the ground; he
could proceed no further; his brain was
dizzy, his sufferings more acute; then all
was lost in unconsciousness—the insen-
sibility of death! The hero, for hero he
was, had paid the last debt of nature,
and had gone to his reward.

Later, when the exploring party en-
tered the mine, the two were found, the
head of the dead pillowed on the breast
of the living—the man who had been
saved at the eleventh hour.

Silently the procession moves on its
way save when a halt is made for a
change of bearers, or when the choir
who lead raise their voices in the pathetic
strain of a funeral dirge, until the grave
is reached and the last sad rites com-
pleted.

"He was a good man," says one.

"Brave as the bravest," is the hearty
response, and the aged minister lays a
kindly hand on the shoulder of Richard
Wilson, and whispers gently: "Greater
love hath no man than this, that a man
lay down his life for his friend"—*Winnipeg Times*.

A prominent mining report of
Denver, Colorado, assayed an aver-
age specimen of quartz, taken from
one of the Manitoba mines, and
found that it carried \$203.58 of
gold to the ton. He speaks of the
ore as being of astonishing richness.



IMPORTANT SALE

Of choice and well situated Farm
Lands in the Province of Mani-
toba and North-West Terri-
tories of Canada.

At Winnipeg, commencing on Tues-
day, the 15th May next, there will be
offered at public auction, a portion of
the even numbered sections lying along
and adjoining the Canadian Pacific Rail-
way in Manitoba and in the Territorial
District of Assiniboia, and of the even-
numbered sections lying between the
belt of the main line of the Canadian
Pacific Railway and the International
Boundary and between the Red River
and the Coteau or Dirt Hills.

COAL LANDS.

Some of the Coal Lands on the Souris
River will also be offered.

Further particulars of the lands, the
upset prices, and the terms and condi-
tions of sale may be learned at the Do-
minion Lands Office, Winnipeg.

By order,

LINDSAY RUSSELL,

Deputy of the Minister of the Interior.

Department of the Interior,

Ottawa, 20th April, 1883.



LACHINE CANAL.

NOTICE TO CONTRACTORS.

Sealed tenders, addressed to the un-
derigned, and endorsed "Tender for the
Formation of Basins near St. Gabriel
Locks," will be received at this office
until the arrival of the eastern and west-
ern mails, on Wednesday, the 6th day of
June next, for the formation of TWO
SLIPS or BASINS, on the north side of
the Lachine Canal, at Montreal.

A plan and specification of the work
to be done can be seen at this office, and
at the Lachine Canal Office, Montreal, on
and after Tuesday, the 22nd day of May
next, at either of which places printed
forms of tender can be obtained.

Contractors are requested to bear in
mind that tenders will not be considered
unless made strictly in accordance with
the printed forms.

An accepted bank cheque for the sum
of \$2,000 must accompany each tender,
which sum shall be forfeited, if the party
tendering declines entering into con-
tract for the works at the rates and on
the terms stated in the offer submitted.
The cheque thus sent in will be returned
to the respective parties whose tenders
are not accepted.

This Department does not, however,
bind itself to accept the lowest or any
tender.

By order,

A. P. BRADLEY,

Secretary.

Dept. of Railways and Canals,
Ottawa, 21st April, 1883.

**FOR SALE,
PHOSPHATE PROPERTIES IN THE TOWN-
SHIP OF HULL.**

MINERAL RIGHTS.

Lot No. 15, in the 7th Range.			
" " 14, " 8th "			
W $\frac{1}{2}$ of N $\frac{1}{2}$ " 6, " 11th "			
S $\frac{1}{2}$ " 2, " 11th "			
S $\frac{1}{2}$ " 12, " 11th "			
S $\frac{1}{2}$ " 13, " 11th "			
Lot " 1, " 12th "			

For particulars and price apply at this office.

PLUMBAGO LOT FOR SALE

IN THE TOWNSHIP OF BUCKINGHAM,
On which are extensive surface shows and out-croppings of fine quality of Graphite. Price \$1,000. Further particulars to be had at this office.

**PHOSPHATE PROPERTIES
FOR SALE**

IN THE TOWNSHIP OF WAKEFIELD.
Mining Rights on S $\frac{1}{2}$ of Lot No. 16, in the 1st Range.
" " on Lot No. 23, in the 2nd Range.
" " " No. 26, in the 4th Range.
" " " No. 20, in the 5th Range.

The fee simple of Lots Nos. 22 and 23, in the 4th range, (400 acres). All these lots have been carefully explored by experts and very favourably reported on; they are virgin properties and in the heart of the Phosphate Belt. For further particulars and price apply at this office.

**PHOSPHATE PROPERTY
In the Township of Portland West,
FOR SALE.**

Lots 25, 26, 27 and 28, in the 3rd range. Some excellent surface shows have been uncovered on these lots and only require capital for developing. Price and particulars given at this office.

ASBESTOS PROPERTY FOR SALE.

The mining rights on S $\frac{1}{2}$ of Lot No. 11, in the 8th range of Templeton. The mineral is of the finest quality of fibre and in large quantity. Specimens may be seen and particulars and price ascertained at this office.

**PHOSPHATE PROPER
For Sale in North Burgess.**

Mining Rights of W $\frac{1}{2}$ of 13, the 5th range. About 100 ton very high grade Phosphate h been shipped from this prope Will be sold to an immediate chaser for \$750. Apply at office.

**FOR SALE,
White Marble Quarry on Calu
Island.**

At this quarry there is an i haustible supply of most beaut white marble. Price \$800. S ples to be seen and information tained at this office.

MINES AND MINERALS.

Developed and Undeveloped Mines and Minerals of Commercial Value BOUGHT AND SOLD.

PROPERTIES EXAMINED AND ANALYSES MADE OF ORE OF EVERY DESCRIPTION.

A Competent Expert is permanently engaged for the purpose of making Unprejudiced Reports on all Mines pla in our hands for Sale, such reports being at all times open to intending purchasers for examination.

Phosphate, Iron, Iron Pyrites, Copper, Asbestos, Mica, Plumbag
Gold and Silver Mines, and Marble and Sand-
stone Quarries, For Sale.

MINERAL LANDS EXAMINED AND REPORTED ON BY OUR EXPERT; ALSO, ANALYSES OF MINERA
OF EVERY DESCRIPTION MADE BY A COMPETENT ASSAYIST.

**Correspondence with Owners of Mines and Capitalists desirous
investing is most respectfully solicited.**

Address all Communications to

The Publishers Canadian Mining Review,

Union Chambers, 14 Metcalfe Street, Ottawa, Canada.

CHOICE, (SELECTED) CLASS, 1
**PRAIRIE FARM LANDS
FOR SALE**

IN THE
BIRTLE DISTRICT, MANITOBA.

Section.	Town- ship.	Range- West.	Acres.
3	14	23	640
17	14	23	640
15	14	23	640
19	14	23	640
W $\frac{1}{2}$ and N. E $\frac{1}{4}$	35	14	480
N $\frac{1}{2}$ and S. E $\frac{1}{4}$	19	15	480
S $\frac{1}{2}$ and N. E $\frac{1}{4}$	15	16	480
E $\frac{1}{2}$ of N. W $\frac{1}{4}$	15	16	80
S $\frac{1}{2}$	3	17	320
N $\frac{1}{4}$	9	15	320
S. W $\frac{1}{4}$	31	18	160

4,880

Title direct from the Crown.

For price and field notes apply at this office.



**TENDERS FOR TIMBER LIMITS IN THE
N. W. TERRITORIES.**

Sealed tenders, addressed to the under- signed, and marked "Tenders for Tim- ber Berths," will be received at this office until noon on Monday, the 2nd day of July next, for Timber Berths in the North-West Territories, situated on the Moose Mountain, in the District of Assiniboine, and on the Bow River and its tributaries, above Fort Calgary in the District of Alberta.

Sketches showing the positions, ap- proximately, of these berths, together with the conditions on which they will be leased, may be obtained at this De- partment, or at the Crown Timber Office, Winnipeg.

LINDSAY RUSSELL,
Deputy of the Minister of the Interior.
Department of the Interior,
Ottawa, 18th April, 1883.

TIMBER LIMIT

ON LAKE WINNIPEG

FOR SALE.

50 Square Miles.

This limit will be very valuable.
Apply at this office for price and particulars.

FOR SALE

The mining rights on 100 of Phosphate Lands situated in Township of Hull, Province Quebec. All of which have carefully selected and have exce shows of Phosphate. The asked for these lands is \$5 per and at this rate parties can clase lots from 100 to 1,000 Specimens on view and all mation given at

F. FOOKS',
Mineral Agency
307 and 399 Wellington St., Ott
Also, the Phosphate Lot No in the 8th range of the Townsh Wakefield, containing 100 a Price \$1,000. (This is the prop of Mr. Farley of Hull.)
Apply to F. FOOK
(Address as above.)

MINING REVIEW

VOL. 1.—No. 8.

OTTAWA, JUNE, 1883.

VOL. 1.—No. 8.

Canadian Mining Review.

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OFFICE:

STATION CHAMBERS, 14 Metcalfe Street.

The CANADIAN MINING REVIEW will continue to be published as a monthly journal in the interest of the mining industries of the Dominion. Information concerning Canadian mines and mineral lands is respectfully solicited by the publishers, who will be, to a great extent, dependent upon their correspondents for reports of progress in mining industries in Canada, especially outside the provinces of Ontario and Quebec. Should misstatements of facts or statistical inaccuracies appear in the columns of the REVIEW the publishers will be indebted to anyone who will at once direct their attention to same and assist them in making corrections. The paper has already a circulation of 4,000, extending over all the provinces of the Dominion, to the United States, Great Britain and Europe, and its main object is to induce the consolidation of local and foreign capital, with a view to bringing about the speedy development of Canadian mineral lands. In order that its aim may be accomplished, a liberal support from those who are interested will be necessary, and is looked for. The advertising columns of the paper are open to those who have properties for sale, to people wishing to invest in mineral lands and to merchants generally. Dealers in machinery and mining supplies will find the REVIEW a valuable advertising medium.

Address all correspondence to the publishers CANADIAN MINING REVIEW, Ottawa.

We beg to call attention to the advertisements, in another column, of mineral lands for sale. True reports of all properties mentioned therein will be forwarded on application by the publishers of the REVIEW.

DOMINION OF CANADA
MINING REGULATIONS.

From letters we have received since the appearance, in the May number of the REVIEW, of the "*Regulations to govern the disposal of mineral lands, other than coal lands*," in the Dominion, it would seem that a misapprehension exists in the minds of a large number of people that, as the said regulations were not on the table of the House for thirty days during the last Session of Parliament, they cannot have become law. Evidently it is not generally known that during last session the Senate so amended the Act that, by publishing any new regulations for four weeks in the *Canada Gazette*, such regulations thereupon become law, and in this case in point the present requirements of the Act have been complied with.

PHOSPHATE MINING.

Throughout the County of Ottawa phosphate mining continues to be prosecuted with the same push and activity that has characterized the industry in this locality during the past two years. In fact it may be said that each month sees additional force enrolled on the lists of miners employed at the various mines, with a correspondingly increased output as a result. New properties are being opened almost daily and in most cases the developments of the deposits more than warrant systematic organization for permanent mining operations. To direct special attention to each company or individual engaged in this great work would be invidious and would require more space and time than we can afford, so numerous are they, but mention

may be made of the more developed and most productive properties at present in active operation. In the Township of Wakefield the "Gemmell" and the "Haldane" are probably the most productive mines; in Templeton the "MacLaurin" the "American Phosphate Co's" and the "Jackson Rae" mines are sending a large quantity of excellent mineral to the point of shipment; in the Township of Buckingham the "Emerald" is being actively worked, and the result of each day's mining exposes new bodies of high grade phosphate of vast extent; in the Township of Portland East the principal operators are the Dominion of Canada Phosphate Company, Messrs. Bacon, Cameron, McLaren and the "French Company," and all of these have already forwarded a large quantity of phosphate to the front, and continue to carry on active operations; in Portland West, Messrs. R. C. Adams & Co. have opened a new property which promises most satisfactory results; the "High Rock" and the "Union Phosphate Company's" mines are the scenes of life and activity, and this year's output from these properties will be considerably in excess of that of any former year, probably double, and the same may be said of nearly all the mines referred to. This industry of phosphate mining is becoming a most important one in Ottawa County and is daily adding to the value of land of every description in the district; it causes a very large amount of money to be circulated throughout the county, enables farmers and their sons to earn liberal wages during the seasons of the year when their time could not be profitably employed at home, and as a natural consequence these men are earning the means to improve their farms by erecting more substantial and commodious dwellings and out-buildings, by employing the modern agricultural appliances for sowing and reaping and by expending a certain amount annually on a permanent system of drainage. All this should be taken seriously into account by the Pro-

vincial Government before it formulates any cast-iron regulations to govern the disposal of mineral lands. It cannot be too forcibly impressed with the importance of giving every encouragement to the men who have already devoted so much time and money in inaugurating the mining industry, in exploring and prospecting the country and in carrying on active mining operations on the properties they have acquired from the Government, and otherwise. These men may be termed the "pioneers" of the phosphate region in the Province of Quebec, and they are certainly the men first entitled to consideration and encouragement at the hands of the Government. To allow our mineral land to fall into the possession of speculators is a most pernicious principle and should be avoided. The parties already engaged in mining and who are prepared and even anxious to extend their operations, should be the first to receive favor from the Government and to whom moderate concession should be made when acquiring Government mineral lands. Speculators purchase properties for speculative purposes, not to work them, and will allow them to remain idle until others, by their enterprise and faithful industry, enhance their value, or until, by misrepresentation and fraud, they can induce confiding capitalists to purchase from them at fabulous prices. Many such transactions might be instanced, and each one has been attended by results that will be most injurious to the country and sooner or later must militate against the prosperity of our mining interests. Those gentlemen most deserving of mention, as being the active promoters of phosphate mining in the County of Ottawa, are Messrs. W. A. Allan, of this City; J. G. Miller, now engaged in mining in the West Indies; Gerald C. Brown, of Lachute; the late E. W. Murray, formerly of Buckingham; Wm. McIntosh, of "High Rock," fame, and Edward Watt, now of Perth. The latest reports that have reached us from the various mines go to corroborate

the figures given in the article on phosphate mining that appeared in the May number of the REVIEW, and there exists no doubt that quite 15,000 tons of first quality ore will be shipped by rail and water from Templeton and Buckingham this season.

Recent accounts of phosphate mining in the Perth district are of a most satisfactory nature and go far to prove that the deposits in that vicinity are holding out well. Some that have been but recently opened are developing even better than any of those that have heretofore been worked.

QUOTATIONS.

There has been a drop in the ruling English quotations for Canadian apatite since those given in the May number of the REVIEW, the latest being 1s. 2d. for 75 per cent. phosphate of lime, with one fifth of a penny rise per unit for shipments over-running 75 per cent. For 85 per cent. mineral this would be equivalent to about \$28.25 per ton of 2,240 lbs. f.o.b., Liverpool.

ANALYSES.

The analysis of shipments of mineral from the principal apatite mines in the County of Ottawa, run at 80, 81½, 83½, 85, and as high as 86 per cent. phosphate of lime. Professor Hoffman, (Geological survey, 1877-78) reports that the mineral from some of the mines assayed as high as 88 and 89 per cent—this of course was for picked specimens, not for whole shipments, as the above figures for this season's output represent.

FREIGHTS.

Freight to Liverpool and London, from Montreal and Quebec, for Canadian phosphate this season, is quoted at 10s. 6d. to 12s. per sailing vessels, and 15s. per s.s. 500 tons were shipped by s.s. on Saturday, 16th inst., to England, on account of Mr. A. Lomer, of Montreal. Tonnage has been offered at rates considerably below those quoted, but this has been special, and at short notice, in cases of emergency.

FATAL ACCIDENT

At a Phosphate Mine in Templeton

A sad accident occurred at Mr. McLaurin's Phosphate Mine in Templeton, on Friday, the 8th of June, by which one man was instantly killed, and three others seriously injured, one of whom has since died from the effects of the injuries he received. The accident, as far as we can learn, is attributed

to no direct carelessness on the part of any of the men in charge of the work. It was occasioned by the sliding in of a portion of one of the walls, and the occurrence, followed by so melancholy a result, could in no way have been foreseen. The employees about the mine number over forty, and the foreman, Mr. Archibald Woodburn, is spoken of as a practical and experienced miner, ever watchful for the slightest appearance of danger, and careful in giving strict instructions to the men under him to avoid anything like carelessness. Mr. McLaurin, the proprietor, has never neglected any precaution to protect his men against accident, and no one, probably, will feel the sad result of this unforeseen disaster more heavily than he. It is to be hoped that a long time will elapse before another such calamity will be recorded.

A NEW COMPANY.

A meeting was held in Montreal on Thursday, the 19th June, at the office of the Graphic Company for the purpose of forming a Company to engage in the Phosphate mining business in Canada. A large number of those interested in such affairs were present, and a Company was organized under the title of the "Dominion Phosphate Mining Company." The following gentlemen were then elected as the first Board of Directors:—Charles Kyte, Fanwood, New Jersey; A. Shepard, Fanwood, New Jersey; Henry Earle, Brooklyn, N. Y.; A. J. Huntson, Brooklyn, N. Y.; W. H. Nichols, Brooklyn, N. Y.; T. C. Keefer, Ottawa, and A. F. Riddell, Montreal. After the election of the Board the meeting adjourned until the Directors should meet for the election of officers. The property owned, and now being operated, by the Dominion Phosphate Mining Company is situated in Portland West, and was referred to in the May number of the REVIEW. The firm of Van Rensselaer, Falding & Co. are working the mine under contract, and the work is progressing in a most satisfactory manner. The contractors are provided with the most modern appliances for carrying on their work to advantage, and are employing competent and skilled labour. The property is one of great value, being unusually rich in mineral of high grade, and was purchased by the D. P. M. Co. from Mr. W. A. Allan, of Ottawa.

RECENT SALE OF PHOSPHATE LANDS BY AUCTION.

On Thursday, the 31st day of May, the Quebec Government held a sale, by auction, of certain phosphate lands in the County of Ottawa, at which were present many of the best known men engaged in active mining operations in the County and a number of mineral land specu-

lators. The sale was advertised to take place at the City Hall, in Hull, at 11 a.m., and shortly after that hour the auctioneer, Mr. F. J. Potter, of Montreal, offered the first lot.

Mr. St. O. Chapleau was the first to secure a lot, and after considerable competition the sale closed. The following list gives the location of the properties sold, average of each lot, the price paid, and the names of purchasers:—

Township of Portland East.

Lot No. 16, in 6th range, containing 161 acres, sold to Mr. St. O. Chapleau at \$5.75 per acre.

Township of Portland West.

Lot No. 18, in 5th range, containing 100 acres, sold to Mr. J. Erratt at \$5.00 per acre.

Lot No. 19, in 5th range, containing 100 acres, sold to Mr. C. H. Mackintosh at \$5.00 per acre.

Lot No. 5, in 8th range, containing 116 acres, sold to Mr. St. O. Chapleau at \$31.50 per acre.

Lot No. 6, in the 8th range, containing 113 acres, sold to Mr. St. O. Chapleau at \$31.00 per acre.

Lot No. 10, in 8th range, containing 89 acres, sold to Mr. Wm. McIntosh at \$5.00 per acre.

Lot No. 11, in 8th range, containing 101 acres, sold to Mr. St. O. Chapleau at \$5.00 per acre.

Lot No. 3, in 9th range, containing 122 acres, sold to Mr. Williams, of the Union Phosphate Co., at \$5.00 per acre.

Lot No. 4, in the 9th range, containing 110 acres, sold to Mr. Williams at \$5.00 per acre.

Lot No. 9, in 9th range, containing 110 acres, sold to Mr. Williams at \$9.00 per acre.

Lot No. 17, in 9th range, containing 109 acres, sold to Mr. C. H. Mackintosh at \$5.00 per acre.

Township of Bowman.

Lot No. 6, in 6th range, containing 100 acres, sold to Mr. Higginson, for Mr. Poupore, at \$8.00 per acre.

Lot No. 8, in 7th range, containing 100 acres, sold to Mr. — Rae at \$6.25 per acre.

The sale was concluded shortly before one o'clock, and the purchasers expressed themselves satisfied with their bargains. The conditions of sale were as follows:—

The purchase money to be paid in full at the time of adjudication, or half the amount may be paid, either in cash or by accepted check, otherwise the land will be immediately offered for re-sale. It is distinctly understood that the whole of the purchase money must be paid before 4 o'clock on the day of sale, otherwise the amount already paid will become forfeited.

The purchaser to pay for any real improvements existing on the lot or lots belonging to any other party.

These sales will also be subject to all the provisos contained in the laws and regulations concerning mines at present in force in this Province.

As an evidence of the rapid increase in the value of phosphate lands it may here be mentioned that in 1877 the Quebec Government were offering their phosphate lands at \$1.00 per acre, subsequently the price was increased to \$2.00; at the sale in Quebec, in November, 1881, the upset price was put at \$3.00, and at this last sale in Hull on 31st May all the lots advertised were offered at an upset price of \$5.00 per acre, being an increase of no less than 400 per cent. in six years.

ROADS! ROADS! ROADS!

Can it be possible that the Quebec Government is indifferent to the opening up of roads into the mining districts of the County of Ottawa? Surely not! And yet, since phosphate mining began in that county, the Government has not, to our knowledge, expended one dollar to facilitate access to the mineral region and the transportation of the product of the mines. It is well known that a considerable sum of money is annually voted for colonization purposes and that a large portion of it is devoted to the construction of roads, leading into the partially settled sections of the province, for the convenience of the pioneer farmer. Why then should the miner's rights be ignored? When it is taken into consideration that, through the enterprise and energy of prospectors and miners the Government has derived great benefits, it is but reasonable that they should demand substantial assistance in making roads that would enhance the value of the mineral lands they have acquired. Owing to their industry the value of the mineral lands still held by the Government has increased ten fold during the past five years, and the amount of money already paid into the Treasury by purchasers not to speak of the vast amount that is annually being circulated by them in the county, is sufficient to warrant liberal recognition at the hand of the Government in the manner referred to. It is to be hoped that attention will be at once directed to this much needed work and that no time will be lost in having the want supplied.

MINING NOTES.

WESTERN ONTARIO AND MANITOBA

The mining fever at Thunder Bay and all through that district is now at a high pitch. Mining parties are prospecting in every direction, and fresh developments are reported almost daily. The mineral wealth of the country is only beginning to be known.

A Winnipeg paper says the Rabbit Mountain silver mine on Lake Superior is said to be the richest of

the continent. Two miners are alleged to have taken out \$100,000 worth of ore within six weeks.

A valuable coal mine has been discovered at Medicine Hat, within stone's throw of the railway line.

Manitoba Gold Mines.

Reports have reached us, in a general way, of how mining is progressing at the Lake of the Woods. The work of developing the properties in operation goes ahead apace, and the results have been in the main most satisfactory. In the majority of cases, as the shafts descend, the veins show positive signs of increasing in width and the lartz improves in richness. The "Winnipeg," the "Keewatin," the "Argyle" and the "George Heenan" companies have been doing good work, and confidence has been established in the value of the properties under their control. Rushing mills, steam hoists and other modern machinery have been erected at the mines and more is being taken in, operations are being conducted with the unwavering activity which has characterized the movements of the Manitoba mining organizations ever since their inception, and the public may look for purishing accounts of the gold held in the Lake of the Woods district during the present summer.

It is stated that the Hon. Nelson Hood, Secretary-Treasurer of the Argyle Gold Mining Company, has received a telegram informing him that another large vein was discovered a day or two since, that the stamp mill is running full blast, that the mine is looking very well and as rich as ever. An assay has been made of the ore, which shows a yield of \$7.29 to the ton of 2,000 lbs.

MINES ON LAKE SUPERIOR.

The following article on mining near Lake Superior, appeared in the *N. Y. Mining Record* of June 9th, and goes far to corroborate the reports of the vast richness of the mines referred to, which have appeared in some of our Canadian newspapers.

"The Huronian Mining Co.—It appears from reliable reports and formation, that the richness of the Black Fish mine, now being worked by the Huronian Company, was fully practically realized last summer. Although assays of picked specimens have heretofore shown an enormous yield of the precious metals, the real value of the mine was only ascertained last year, when Messrs. Keefer & McKellar took it over a ton of the average ore, packed it on Indians' heads for several miles, and conveyed it by birch-bark canoes through the small streams and lakes of the region to the railway, and from thence had it conveyed to New York for practical treatment. Since test referred to

was made in September last, the Thunder Bay branch of the C. P. Railway has been opened, and the district is now supplied with railway accommodation. Vein occupied is a true fissure from six to eight feet wide, traversing the highly prized talcose slate formation of Huronian age. It carries both gold and silver in paying quantities, and the ore is free milling. In it is also found the extremely valuable sylvanite ore—the true telluride of gold and silver. An assay of the high grade ore yielded to Messrs. Ledou & Ricketts, \$5,971.60 of gold and silver to the ton, chiefly the former, while the yield of a ton of average ore, taken without selection, crushed, sampled and assayed, went \$19.28 to the ton. This is a showing which at once brings the district into the line with the other rich gold and silver producing camps on this continent. The machinery is now being set up and prospectors are already invading the country, as it is well known that the district abounds in metalliferous veins, which, like the Huronian Company's property, have remained so long untested, owing no doubt to want of railway communication, an inconvenience which no longer exists. Messrs. Keefer & McKellar have also formed another company to operate in the district, known as the Laurentian Mining Company, and as they are not seeking subscribers or sale of stock, it is evident they have faith in their undertakings, which argues well for the district.

Prince Arthur's Landing (Port Arthur) is terminus of Canadian Pacific R. R. on Lake Superior. Gen. Wild is one of the fortunate mining men operating on Lake Superior. He is one of the proprietors of the mine known as the Rabbit Mountain silver mine, a recent discovery within twenty-five miles of Prince Arthur's Landing, on Thunder Bay. Practical work has also been commenced on his property. Houses are up, roads made and mining commenced, a considerable quantity of ore being on the dump. A stamp mill and suitable machinery will be erected as soon as navigation opens to that district. Very rich specimens (one weighing a pound of solid black silver) have been taken from this mine, which is in the black silurian slate formation. The lode, a large one, carries silver in paying quantities. It is claimed that it averages several hundred dollars to the ton, but as no test has yet been made in a large way, that we are aware of, it is sufficient to know in the meantime that silver exists in it, at any rate in large paying quantities. The district was once made famous by the wonderful productions of Silver Islet. The recent rich finds in new localities again bring it into notice, and they promise the establishment of permanent mining camps.

The owners of the mine are General Wild, Captain Dan McPhee and Oliver Dounis, the discoverer.

During the winter the men have been occupied in opening up a road to the mine to Point De Meuron, and actual mining was not commenced until lately. Mr. Louis arrived in town yesterday, and a *Herald* reporter had an interview with him last evening to ascertain what had been done in the way of mining. He informed the reporter that himself and Captain McPhee commenced mining on the 14th of February last. They have sunk a shaft and commenced cross-cutting on the vein. Up to the present they have gone a width of forty-five feet, but as yet have not reached the width of the vein, which is a true fissure. Every particle of rock that has been taken out is fit for the stamp mill. The ore taken out is quartz and spar. The appearance of the silver is black—black sulphate and native—the purest silver there is. The vein ore carries none of the baser metals; nothing but the pure silver. The vein can be traced for a considerable distance on this property, and in any part of it can be found silver in paying quantities. No more than two miners have been at work as yet, and in six weeks' work they have taken out one hundred thousand dollars' worth of silver. This statement seems almost incredible, but it is nevertheless true. In crossing the vein they discovered a vug, in which have been found nuggets of silver weighing from one half a pound to seven pounds—black sulphates. In this vug they did not put in a blast, but could pick out the nuggets of silver with their hands and shovels without actual mining. Out of this vug they have taken thirty-five thousand dollars' worth of native silver. The full width of the vein is not known, but they have already crossed it for forty-five feet. The location is situated about a mile and a half beyond Rabbit Mountain, which is just outside of Paipoonge, about twenty-four miles from Port Arthur. The mine is in a valley at the foot of the mountain. Mr. Dounis informs us that a team has been sent up to the mine to-day for the purpose of bringing back a load of silver. Several loads will be brought to this place and shipped to the smelting works. The mine is reached by the road to Point de Meuron, thence by a new road cut to the mine, a distance of seven miles. General Wild and Captain McPhee will be here in a few days. The General will take the silver east, and while there will purchase all the necessary machinery for the full working of the mine, and a stamp mill, which will be forwarded here at once and sent to the location. This mine is paying for itself. The owners have worked with their own hands and taken out the silver, with the receipts from which they will purchase the machinery for the further working of the mine. A mine where nuggets of silver weighing seven pounds and under, can be picked up, and some of the products of

which will go at least \$12,000 to the ton, must be pronounced to be among the foremost mines of this continent. There is a likelihood of the vein improving as they go down, as it is in the proper kind of rock."

CANADA NORTH-WEST LAND CO.

We learn by cable from London that the report of the transactions of the Canada North-West Land Co. for the past nine months, which has just been issued, shows a net profit of £64,000. At the end of this month the annual meeting will be held, when a recommendation will be made to divide the earnings as follows: The payment of a dividend of two shillings per share, which is equivalent to five and a half per cent. per annum on the amount paid up; £14,000 to be placed to the reserve account, and the balance of £23,000 to be carried forward. When it is considered how few land companies are in a position after their first year's operations to pay a dividend, the stockholders of the Canada North-West may be congratulated on the success of their venture, for not only has this result been accomplished, but the foundation of a reserve fund has been laid; and not only so, but a sum sufficient for a reasonable dividend on the ensuing year's transactions has been carried forward. The company's prospects are bright, especially in view of the expected immigration to the North-West during the ensuing season.—*Toronto Mail*, June 16.

The Development of the Saskatchewan Coal Co's Mines.

The Saskatchewan Coal Mining and Transportation Company are meeting with success in the development of their mines west of Medicine Hat. A trial of the coal has recently been made with a stationary engine, and gave unqualified success. A more thorough trial on a much larger scale is to be made this week with a C.P.R. engine, and several of the directors will witness the test. The company expect to be able to sell coal in Winnipeg for eight dollars per ton.

ASBESTOS.

Since our May article on this mineral we have received no further reports on the progress in mining in the Eastern Townships, beyond advice that the mines are holding out well and that the daily output continues to be about the same. The mines are returning good profits to the owners, and the mineral is of an excellent quality. Several letters have recently been received at this office, from people seeking information about the Asbestos deposits in the Ottawa Valley, but unfortunately the properties, in which the mineral occurs in this part of Canada, have not been sufficiently developed

to admit of our making an intelligent report of their probable value. The quality is of high grade but, until more work has been done in the way of opening up the deposits, the quantity of mineral will remain a matter for speculation. As capitalists usually like to know what they are purchasing, and as it is satisfactory for owners to have some idea of the value of the property they are offering for sale, we would strongly recommend them to expend a small sum of money in preparing their Asbestos deposits for inspection.

We will at all times be pleased to receive information concerning the discovery of Asbestos in any part of Canada and to render every facility in our power to open up negotiations between owners and those seeking investment in properties, with a view to the speedy development of mines. A recent report on the deposit, referred to in our last number, occurring on S $\frac{1}{2}$ of Lot 11, in the 8th Range of Templeton, speaks of the property as one of considerable value.

It is reported from Montreal that Mr. L. A. Senecal has purchased an Asbestos property in the Eastern Townships, from Mr. Charles Lionais, for \$45,000. This is a large sum, and, if the report be true, the property referred to should be one of considerable extent and unusually rich in mineral.

MICA.

For many years it has been a grave question in the minds of prospectors and others as to whether any of the Mica deposits, in the formation contiguous to the Ottawa Valley, would prove to be of merchantable value. Recent discoveries have settled this question in a most satisfactory manner; specimens sent to us from several localities show that, not many miles from this city, there exists extensive deposits of Mica, of a very excellent quality, as regards clearness and the size of the sheets to be obtained, and experiments prove it to be capable of withstanding the greatest degree of heat without showing signs of crepitation. That Mica mining will, at an early date, be numbered among the many important industries of this section of the Dominion of Canada is now beyond a doubt, and we strongly advise farmers and others throughout the country, who have already observed, or may hereafter discover this mineral on their property, to bring, or send by mail, to the office of the MINING REVIEW, fair average specimens, with a description of the rock with which it is associated, the name of Township and the number of Lot and Range in which the deposit occurs, mentioning also the probable size of the sheets that can be taken out, in order that we may make a clear and unprejudiced report

on same. We have had many enquiries lately from our correspondents about this mineral and desire to put ourselves in a position to give the public reliable information on the subject.

IRON.

Valuable discoveries of Iron Ore are being brought to our notice almost daily. Specimens sent to us quite recently from the Township of Bagot prove to be of unusual purity; it is a magnetic ore of high grade and free from titanium, with an almost imperceptible trace of phosphorus, not sufficient to depreciate the value of the ore in the smallest degree. Specimens of Red Hematite have also been sent to us from the same district, and in the next number of the REVIEW will be found complete analyses of the samples in our possession.

It is to be hoped that the manufacturing of pig-iron at our Canadian mines may be looked for in the near future. A movement is on foot to induce the Dominion Government to increase the bounty they have offered to pay on home manufactured "pig." A deputation of influential men have already waited on Sir Leonard Tilley and have framed their arguments, in favour of the proposed increase, in most forcible terms. The matter will receive the favourable consideration of the Government, but no definite action can be taken until the next Session of Parliament.

A New York writer, in calling attention to the vast number of Iron deposits in Canada, says there is every probability of a heavy rivalry between Canada and the United States in the manufacture of this metal, not only on account of the remarkably excellent quality of the Canadian metal, but on account of the low prices of labour and material employed in its production; and the writer exemplifies its quality from a test made by the Superintendent of the West Point foundry, who reports a square inch of Canadian iron resisting 20,000 lbs. more pressure than that from the most popular works in the United States. The same iron, he says, has been manufactured into beautiful specimens of steel.

IRON PYRITES.

A great quantity and variety of Iron Pyrites is distributed throughout the Ottawa district, in fact it is more or less associated with every other mineral yet discovered, but not in sufficiently paying quantity to warrant its being mined for merchantable purposes. The only well defined vein of any size, that we know of, occurs within

half a mile of the Ottawa River. The vein, as it appeared on the surface, measured about two inches in width and can be traced for some four or five acres in length. An opening has been made and a shaft sunk forty feet on the vein, at which depth it has increased to six feet in width, and shows signs of widening at the same ratio as it descends. There has been about 300 tons of Pyrites taken from this shaft, the analysis of which shows about 1,000 lbs. of sulphur per ton. In the very heart of the hard granite rock in which the mineral occurs is frequently to be found a conglomeration of a bluish clayey substance, of a soft soapy consistency, and which hardens when exposed to the weather; it appears to be impregnated with sulphur, and that it should be met with in the heart of this hard solid rock caused some surprise to the inexperienced miners engaged in the work. This property has been placed for sale with the publishers of the REVIEW.

COPPER MINING IN NEWFOUNDLAND.

Copper mining has become, during the past few years, a source of wealth in the Island of Newfoundland, and the day having gone by when speculators and others were exercised by the copper fever, the industry has reached a solid basis and mining operations are now carried on with systematic activity. The three most active mines are the "Tilt Cove," "Bett's Cove" and "Little Bay." The "Tilt Cove" was the first mine opened and up to the close of 1879 its owners had exported ore to the value of over one and a half million of dollars, the ore averaging about \$30 per ton. From 1875 to 1879 nearly three million dollars worth of ore was exported from "Bett's Cove" mine, averaging about \$24 per ton, and the total value of the ore shipped from the Island previous to the close of 1879 exceeded four and a half millions of dollars. The "Little Bay" mine is said to be improving as greater depth is reached, the ore increasing in quantity and yielding a greater proportion of metallic copper as mining operations proceed. It was opened in 1878, and up to the close of 1881 sixty-six thousand five hundred tons of ore had been exported at an approximate value of \$1,750,000.

The export of copper ore from Newfoundland during the past three years, viz: 1880, '81 and '82 has reached an average value of nearly half a million annually, and, though the statistical returns of work done during last year have not yet reached us, we are prepared to hear of a considerable increase in this year's exportation.

NOTES ON COPPER MINES.

THE COPPER MINES OF CORNWALL (England), which have been worked for centuries, continue to be worked at a handsome profit; the average yield of the ore is $6\frac{7}{10}$ per cent., the veins are from 3 inches to 4 feet wide.

THE DEVON GREAT CONSOLIDATED COPPER MINING COMPANY, commenced operations in 1844, with £1 per share then paid in, steadily continued work. In 1881 the large amount of £358 had been paid in dividends on each share. In 1856 the £1 shares sold for £4; in 1881 the mine was paying monthly dividends and the shares were quoted at £410. The ore yields $8\frac{3}{4}$ per cent.; the veins are 4 inches to 6 feet wide.

THE WHEEL BULLER COPPER MINE.—The par value of the share when the company was first organized, was £5; the stock has steadily increased in value, and in 1881 worth £1,025 per share.

THE CAPELTON COPPER MINE, near Sherbrook, in the Province of Quebec, was said to pay a profit of \$45,000 annually on the capital invested, though the average yield of the ore is but 4 per cent.

The copper mines of Sweden: worked at a profit, notwithstanding the ore yields but 1 or $1\frac{1}{2}$ per cent. and a little silver.

THE NEWFOUNDLAND COPPER MINES, which are considered very valuable, yield (according to the return of sales at Swansea) $6\frac{1}{4}$ per cent.

THE CALUMET AND HECLA COPPER MINE, on the south side of Lake Superior, yielding $4\frac{1}{2}$ per cent. metal, has been worked for nearly a quarter of a century; the par value of shares is \$25; to-day they are worth \$238 and the amount paid in dividends has reached \$22,850,000. The estimated value of the metal copper raised in 1879, was over \$6,000,000. The current value of the mine is \$24,000,000.

THE AUSTIN MINE, on the shore of Echo Lake, County of Algoma, Province of Ontario, according to corroborated report, has a vein of yellow sulphuret of copper ore, extending the entire length of the company's property, varying from 25 inches to 35 feet in width. The vein is enormously rich, yielding from 10 to 20 per cent. of metallic copper, as per the following assay one made by an analytical chemist in Boston gave $15\frac{3}{4}$ per cent.; second made by Christian Hoffman Esq., chemist to the Geological Survey of Canada, yielded 18 per cent., and the average of the different assays made by Professor George Baptie, Esq., M.A., B.A., the Normal School at Ottawa, produced $22\frac{1}{2}$ per cent. of metal. The average ore, at the depth of 40 feet in the shaft, yields 10 to 12 per cent. of metal, and yet this valuable property is allowed to remain idle. Can this be explained?

GOLD MINES OF NOVA SCOTIA.

Having had occasion to ask for information concerning the gold mines owned by the Hon. Justice Henry, at Wine Harbour, N.S., the following general description of the property has been forwarded to us:—

It consists of 190 mining areas, about 100 acres, and is situated on the Atlantic Coast, about 100 miles east of Halifax, and ten miles from Goldenville, in a district where Gold mining has been carried on successfully for years. There are numerous quartz leads crossing the property on an east to west course, measuring from one and a half to eighteen inches in width, and most of them showing gold. A belt of slate, about twenty feet in width, also appears, and it is reported to be workable from the surface at a good margin of profit. The main shafts have been sunk on some of the leads and the quartz taken therefrom has yielded from one and a half to nine ounces of gold to the ton. The engine employed for the steam hoists and pumps is said to be capable of also working a fifteen stamp crusher, but up to the present time an eight stamp crusher, run by water power, has been used—available water power being convenient to the property. The quartz is carried to the crusher, a distance of about one mile from the shafts, at a nominal cost. Best quality of steam coal is worth, at the mine, about four dollars a chaldron. In 1881, and part of 1883, six hundred and ninety-seven tons of quartz were mined at Wine Harbour, yielding 887 ounces of gold—the average yield per man being \$2.35 daily. If more capital were employed on this property, under proper management, there exists little doubt that the work could be carried on to better advantage. Statistical reports go to show that gold mining in Nova Scotia has yielded a higher rate of remuneration, for the labour employed, than in Australia or California.

A GOLD BRICK.

A communication from Halifax reached us on the 15th inst. announcing the arrival in that city of a gold brick valued at \$3,000, being the product of about forty ton of quartz, from the Gallagher mines at Isaac's Harbour. This shows a yield of \$75 of the precious metal per ton, and if the 40 ton referred to is of the average richness of the lode, the Gallagher mine is certainly a valuable property.

The Gallagher mine is situated in Stormont, County of Guysboro', and is spoken of in the Report of the Department of Mines for Nova Scotia for 1882, as follows:—

"The Gallagher Gold Mining Company is now in regular working order. A shaft has been sunk, cut-

ting the Mulgrave lode at 360 feet. At 260 feet a cross-cut has been made to the Gallagher lode; levels have been driven, and stoping carried on systematically. Trial shafts on a lode, lying south of the Mulgrave lode, 6 to 10 inches thick, with 5 feet of slate having suckers of quartz, have given very satisfactory results.

The new mill is driven by a 12 inch cylinder, and has 10 stamps of 750 lbs. each, and is on an excellent design. Two Burleigh drills are used at this mine, and were found to give satisfactory results in sinking and driving."

The total yield of gold in the Province of Nova Scotia during 1882 amounted to 14,107 oz., 3 dwts, 20 grns., against 10,756 oz., 13 dwts., 2 grns. during 1881. This is the largest yield since the year 1871, excepting during 1877, when the production rose to 16,882 ounces.

SANDSTONE.

It has been reported that the stone for the new post-office at Brockville is being taken from Mr. Moffat's quarry near Pembroke. A gang of men has been for some time employed in stripping and putting the quarry in shape to accommodate a large force of workmen. There will be about 10,000 cubic feet of stone required for this building, and the first shipment of stone will be made when the foreman has demonstrated that the full quantity of available stone required can be procured from this quarry. The colour of the stone is a red-brown, and the quality is faultless; if possible it is superior to the famous "Ohio stone," which has been so much used in Canada.

It has also been stated that the new Government buildings in this city will probably be constructed of this stone, but this is not to be thought of, for, though the quality and colour is all that could be desired, the quantity need not be looked for in Mr. Moffat's quarry.

RAILWAY NOTES.

Rapid as the strides made by the Phosphate industries of Ottawa County have been, practical experience justifies us in predicting a remarkable impetus during the next few years, for what has been a necessary adjunct to the development of mineral interests, is about to be supplied by the construction of the Ottawa Colonization Railway. The line, as located, starts from a point near Rockland, on the east side of the Aux Lièvres River, and, running northerly and westerly through the heart of the phosphate region, will connect with the Ottawa and Gatineau Valley Railway at Aylwin, on the west side of the Gatineau River. The charter for the first mentioned line was secured by Mr. C. H. Mac-

kintosh, M.P., in May 1882, and at the time of organization that gentleman was elected President. The two schemes, viz: The Ottawa Colonization Railway and the Ottawa and Gatineau Valley Railway were practically united, with Mr. W. A. Allan as vice-President of the former company, and to these two gentlemen much credit is due for their untiring zeal in carrying on the preliminary work and in overcoming the many obstacles that have been thrown in their way. The utmost activity has been displayed by the promoters, who have succeeded in enlarging the company, and there is every reason to believe that construction will begin, simultaneously on both roads, about the middle of July, and will be proceeded with rapidly until completed. Messrs. Harrison Bros., J. Stoddart, Josiah Sypher, W. H. Pitts, C. Gilbert and other well known Americans, now largely interested in phosphate mining, have been elected directors or become shareholders, and by the time our next number appears we will doubtless be in a position to publish full details, together with the names of directors and other interesting information. We are informed that Mr. J. Murray Mitchell, who was for some time on the Board, has now no connection with the enterprise.

OBITUARY.

It is our painful duty to record the death of Mr. E. W. Murray, who passed away, at his home in Buckingham Village, on the 30th of May, after a short illness. Mr. Murray was among the earliest phosphate miners in the County of Ottawa, and, at the time of his death, was owner of one of the most valuable mines on the Aux Lièvres River, in the Township of Buckingham; he was widely known in Montreal and in Ottawa, as well as at home, as a gentleman possessing many sterling qualities, and his genial disposition, generous nature and unassuming manner had gained for him a host of admiring friends, whom he has left behind to deplore his untimely departure from among them, and who all unite in an expression of deepest sympathy with his bereaved family. The interment took place on Friday, the 1st of June, and never before in the history of Buckingham Village was such a funeral procession witnessed. People flocked from far and near to pay a last tribute to the deceased, and the number that followed his remains to their last resting place bore evidence of the wide-spread popularity of the late E. W. Murray.

Charles Burleigh, inventor of the Burleigh Rock Drill, died in Fitchburg, Massachusetts, on Monday, the 28th of May, aged 58. The name of this distinguished man has been familiar to Civil Engineers,

Miners and Contractors in Canada for very many years. The "Burleigh" was the drill used by Messrs. Walter and Frank Shanly on the Hoosac Tunnel, and the good work it accomplished aided them in no small degree in bringing the gigantic undertaking to a successful completion.

OBSTRUCTIONS.

The municipal authorities of some of the corporations of the County of Ottawa cannot be too severely criticised, or even censured, for their shortsightedness and obstinate disregard to the rights of the taxpayers, the convenience of business men and the comfort of the travelling public. In some sections of the country the public roads are a disgrace to any community, and in no section, however remote from civilization, or inaccessible, is any road to be found in a worse condition than that leading from Buckingham Station, on the Canadian Pacific Railway, to the village, a distance of not quite three miles. That this state of things should continue to exist is not to be tolerated by those who are entitled to better treatment, and, for many reasons, it is quite inexcusable. The traffic on this road is increasing year by year; the annual freight carried between the village and the railway station amounts to thousands upon thousands of tons, and, taking into account the fact that the owners of this freight are the mainstay and support of the village and township, it is but reasonable to say that they are entitled to some consideration at the hands of the municipal authorities. The owners and operators of phosphate mines on the Aux Lièvres River will have sent upwards of 13,000 tons of ore this year over the road referred to, and will have circulated not less than \$100,000 in the Aux Lièvres section of the county of which the Township and Village of Buckingham will derive nine-tenths of the benefit. Up to the present time these gentlemen, who are enriching the inhabitants by their enterprise, have been obliged, at their own expense, to keep the public road, from the village to the railway station, in repair for winter traffic—surely the Township Council might do something towards making some permanent improvement to the road for traffic during the summer months. Many of the firms engaged in phosphate mining in the district have expressed their willingness to defray a portion of the expense of carrying out this much needed improvement, and they should certainly be met more than half-way. Mr. J. Kelly is the Mayor of the Township and he will certainly be very lax in the discharge of his duty if he does not bring the matter before the Council and strenuously urge them to authorize the expenditure of a liberal sum of money in macadamizing and thoroughly repairing this piece of road.

LIABLE TO MISLEAD.

Exaggerated reports of the prices paid for mineral lands in the Ottawa district have of late found their way into the columns of the newspapers, and that this is likely to have a prejudicial effect cannot be questioned. It was reported in a local paper, not long since, that a phosphate lot in the Township of Templeton had changed hands, the former owner having received \$60,000 cash for the property—the result of enquiry goes to show that this is quite incorrect. A Toronto newspaper of a recent date refers to the sale of a "mica" mine in the Ottawa Valley for \$75,000. That very good mica has been discovered in this locality cannot be denied, but there exists in the minds of those who ought to know very grave doubts that any such sale as the one referred to has been effected. Such statements as the above have a tendency to do more harm than good, if unreliable, by creating a fictitious value for mineral lands and rendering owners indisposed to sell property at a reasonable price to people willing to purchase and develop mines.

B. B. B.

(BLASTED BIG BLAST.)

A worthy contemporary calls attention to a blast of unprecedented magnitude, thus: "At a recent blast at one of the McLaren Phosphate mines, in Portland Township, one piece was taken out weighing six thousand tons, probably the largest yet taken out in one lump."

Probably so, 6,000 tons of phosphate represents a body of vast dimensions—it has been suggested, that, to accomplish this wonderful phenomenal eruption a combination of circumstances must have favoured Mr. McLaren, such as, an enormous deposit of mineral, unusually powerful explosive employed and a slight defect, in favour of the shipper, in the scale used in weighing the lump.

Answers to Correspondents.

NEW YORK, 6th June, 1883.

Publishers CANADIAN MINING REVIEW, Ottawa.

Dear Sirs,—Will you kindly inform me what is the most direct route to take from New York to the phosphate region of the County of Ottawa? I hope to visit the mines about the end of the present month, and would like to be posted, in a measure, before starting.

C. M. S.

Proceed to Montreal, thence, via Canadian Pacific Railway, to Buckingham. Three steamers leave the latter place at 9 a.m. daily, and run about 20 miles up the Aux Lievres River, stopping at any point and returning same day. This takes in

the Townships of Buckingham, East and West Portland.

For Templeton and Wakefield, Ottawa City is unquestionably the best starting point; and further information, if required, can be obtained at our office.—[Ed.]

PHILADELPHIA, 12th June, 1883.

Publishers CANADIAN MINING REVIEW, Ottawa.

Gentlemen,—I observe, in an article on Canadian Phosphate Mining which appeared in the May edition of the REVIEW, it is stated that "there is likely to be no less than 15,000 tons of high grade ore shipped during the summer of 1883 from the Ottawa district alone." Have you received these figures from reliable source, and do you consider them to be not excessive? G.M.

The figures quoted are to be relied upon. Since the publication of the May edition of the REVIEW they have been verified by personal inspection. See article on Phosphate Mining in this number.—[Ed.]

PERSONALS.

Mr. Thomas Macfarlane, of Montreal, was in Ottawa not long since, and, in discussing the mineral wealth of Canada and the prospects of its development, expressed it as his opinion that mining in the Dominion of Canada promises to develop into enormous proportions. Mr. Macfarlane was at one time Superintendent of the Acton Copper Mines in the Eastern Townships, afterwards he became connected with the smelting works of the Silver Islet Company in Detroit, and subsequently was engaged in the Madoc gold region.

Mr. W. R. T. Pitts, of Philadelphia, Manager in Canada for the American Land and Phosphate Mining Company, was recently in Ottawa and decided to make this city his headquarters. He has secured a residence on Sandy Hill and will occupy it with his family during the present month.

Mr. W. deL. Benedict, M.E., of the firm of Benedict & Cole, New York, has been spending some time in Ottawa and vicinity. He is much interested in the future developments of our mineral resources and considers the prospects bright. Mr. Benedict is a gentleman of some experience in mining, practical and professional, and his opinions and suggestions will doubtless be valuable to those who have been fortunate enough to meet him.

The following gentlemen, prominently associated with the mining industry in the County of Ottawa, have been in the city during the past month. Mr. W. H. Williams, of New York, President Union Phosphate Company; Mr. Wm. McIntosh and Capt. Williams, employed by the U. P. Co., as Superintendents; Mr. Charles Kyte, of Fanwood, N.J., Trustee of the Dominion Phosphate Company; Mr. F. J. Falding and Mr. James C. Weston, of the firm of Van Rensselaer, Falding & Co., of New York, Contractors for operating the mines of the D. P. Co.; Mr. Robert C. Adams, of Montreal; Mr. W. R. T. Pitts, of Philadelphia, Manager for the American Land and Phosphate Company; Mr. Haldane, of Aylmer, and others.

N.B.—Gentlemen interested in mining enterprises, who have occasion to visit Ottawa, are cordially invited to call at the office of the REVIEW.

PARTING WITH THE FAMILY PET.

Some Pathetic Facts Concerning an Amiable and Domesticated Mountain Lion.

The other morning, while the proprietor of the approaching circus and managerie was picking his teeth on the steps of the Russ House, a tall, sunburned, bald-headed man, with pine burs in his clothes and a stick of sassafras in his mouth, approached and said:—

"Be you the wild-animal man, mister?"

The proprietor of the circus admitted that such was the fact.

"Then," proceeded the man from the mountains, "I think I'll get you to make me an offer for a large-sized California lion I've got."

"Good specimen, eh?" asked the circus man.

"Good? Well, I should say so. Measures eleven feet from the tip of his nose to the tip of his tail. Caught him myself when a cub. Just four years old to-morrow."

"Hum—good appetite?"

"Appetite? Great Scott—appetite? Well, I should smile—that's just the point—I call him Jay Gould because he takes everything in. If it wasn't for his appetite and the queer little things it makes him do, I wouldn't part with Gould for a fortune."

"Savage, eh?"

"Well, no: I don't know as I should call Jay savage, exactly—sorter nibblish, though, he may be. He has a kinder habit of gnawing up things, so to speak. In fact, the neighbours—I live up in Bladder's Peak—have gotten to be so fussy and particular of late that I can't so much as unchain J. G. for a little fresh air, without their getting grumpy about it!"

"There's no pleasing some people," said the hippodromer.

"I should say so. Now, for instance, 'bout three months after Jay got to be as big as a boarding-house sofa, I came home one day from a picnic and found he had eaten up Aunt Maria, who had been left at home to mind the house—

leastwise she was nowhere to found; and as Jay Gould seemed sorter bulgy-like and kept enough up hair-pins and false-teeth for day or two, we kinder suspicioned the whole thing."

"Maternal aunt?" inquired the showman, thoughtfully.

"Exactly. My wife took dreadfully at first, and wanted to shoot Jay right off. But I told her that he had probably suffered good deal as it was, and that most likely he'd catch rheumatism and things from the remains, we better call it square."

"And did she?"

"Well she kinder got reconciled after a while, especially as Jay seemed fond of playing with the children. One morning soon after that, my wife's mother—who family lived with me, you see—didn't come down to breakfast. All her false hair was hanging over a chair-back, and Gould crawled out from under the bed, licking his chops, and with his tongue a good deal coated—mother-in-law was always taking things for the live complaint—we saw at once it was another visitation of Providence and that the heavy hand of affliction was again upon us."

"Looked that way, didn't it?"

"Well, as you may suppose, the old lady—that's my wife—pranced around a good deal then, and got down the breach-loader right away. But just then arrived a gold medal from the S. P. C. A. Society, awarded on account of my forbearance in the Aunt Maria business, and so I got her calmed down after a while."

"Pacified her, eh?"

"Yes; I managed to arrange a reprieve for Jay somehow. You see, I was always fond of pets, and tender hearted, and all that, you understand. I argued that the poor animal didn't know that he was doing wrong—merciful man is merciful to his beast, etc. That smoothed things over for another month."

"What happened then?"

"Well, one day I sent Johnny our youngest boy, down to the store for some sugar, and he took Gould along for company. Now, whether it was because Jay was fond of sugar or not, I don't know, but he came home alone, and soon we noticed a peculiar kind of bulge on his ribs, about as big as Johnny, and we concluded that the dread archer had marked another Skidmore—my name is Skidmore—for his own. The whole family took on like mad, and Mrs. Skid. was about to shove the powder-keg under Jay Gould and touch it off herself, when I pointed out that it wouldn't do to desecrate our offspring's tomb in that way. So I just had the burial service read over the lid and tied crape around his neck for thirty days. How does that strike you?"

"After that you kept the animal chained?"

"Well, no. The fact is I set out to get a chain several times, but one

ing and another prevented, until the day last week I actually missed the old lady herself. I looked around for a couple of days, when somehow of a sudden I sorter intened where she was. I gave up about half a pound of emetic right away, but all we could get out of him was a pair of high-heeled shoes and a chest-protector. It was too late—too late. We put the bones and things in a coffin and had it led behind the hearse to the cemetery. Wanted to have as much of the corpse present as possible—don't you see? We had the animal all decorated with flowers and things, as fine as you please. Folks said it was the touchingest thing that ever took place in them parts," and the bereaved husband shed heavily.

"Don't wonder you want to sell the beast," remarksd the menagery man, after a pause.

"Well, I sorter do and sorter don't" said Mr. Skidmore, abstractly. "There's so many memories and things clustering around J. G. seems kinder like parting with the family burying-lot, as it were. On the other hand, though, now that the old lady is gone, I sorter feel as if the old insect had—well, he outlived his usefulness, so to speak. So suppose I just have his box hauled around to your show after the performance this afternoon, and see if we can't strike a bargain." "All right," said the manager. "I'm going up Salt Lake way after while, and perhaps I can work him off for big money to some of the Mormon elders."

"There's a mut of money in him as a family pet," said the other earnestly, and after striking the circus proprietor for a season dead-end the widower shouldered his umbrella and drifted sadly down street.

PHOSPHATE PROPERTY

For Sale in North Burgess.

Mining Rights of W $\frac{1}{2}$ of 13, in the 5th range. About 100 tons of very high grade Phosphate have been shipped from this property. Will be sold to an immediate purchaser for \$750. Apply at the office of the MINING REVIEW.

PHOSPHATE PROPERTIES FOR SALE

IN THE TOWNSHIP OF WAKEFIELD.

Mining Rights on S $\frac{1}{2}$ of Lot No. 16, in the 1st Range.
" " on Lot No. 23, in the 2nd Range.
" " " No. 26, in the 4th Range.
" " " No. 20, in the 5th Range.

The fee simple of Lots Nos. 22 and 23, in the 4th range, (400 acres). All these lots have been carefully explored by experts and very favourably reported on; they are virgin properties and in the heart of the Phosphate Belt. For further particulars and price apply at the office of the MINING REVIEW.

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Phosphate Lot No. 30

In the 8th range of the Township of Wakefield, containing

100 ACRES.

Price \$1,000. (This is the property of Mr. Farley of Hull.)

Apply to

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(Address as above.)

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IN THE TOWNSHIP OF BUCKINGHAM,

On which are extensive surface shows and out-croppings of fine quality of Graphite. Price \$1,000. Further particulars to be had at the office of the MINING REVIEW.

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Frequent enquiries are made at this office for men who understand running Steam Drills, for Mining Captains and Practical Miners. Such men who are out of employment may find it to their advantage to forward name and address, mentioning the class of work they are qualified for, etc., to the CANADIAN MINING REVIEW, Union Chambers, 14 Metcalfe Street, Ottawa.



LACHINE CANAL.

NOTICE TO CONTRACTORS.

Sealed tenders, addressed to the undersigned, and endorsed "Tender for the Formation of Basins near St. Gabriel Locks," will be received at this office until the arrival of the eastern and western mails, on Wednesday, the 6th day of June next, for the formation of TWO SLIPS or BASINS, on the north side of the Lachine Canal, at Montreal.

A plan and specification of the work to be done can be seen at this office, and at the Lachine Canal Office, Montreal, on and after Tuesday, the 22nd day of May next, at either of which places printed forms of tender can be obtained.

Contractors are requested to bear in mind that tenders will not be considered unless made strictly in accordance with the printed forms.

An accepted bank cheque for the sum of \$2,000 must accompany each tender, which sum shall be forfeited, if the party tendering declines entering into contract for the works at the rates and on the terms stated in the offer submitted. The cheque thus sent in will be returned to the respective parties whose tenders are not accepted.

This Department does not, however, bind itself to accept the lowest or any tender.

By order,

A. P. BRADLEY,
Secretary.

Dept. of Railways and Canals,
Ottawa, 21st April, 1883.



TENDERS FOR TIMBER LIMITS IN THE N. W. TERRITORIES.

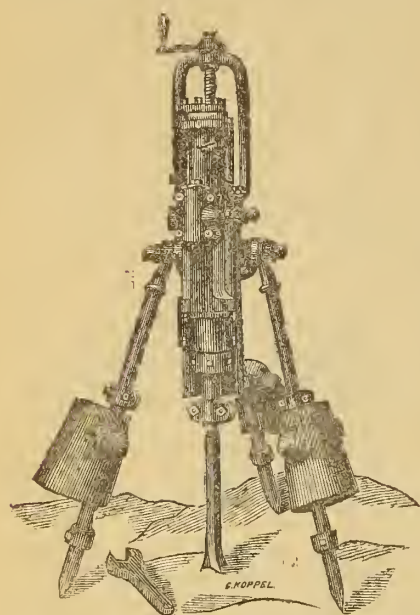
Sealed tenders, addressed to the undersigned, and marked "Tenders for Timber Berths," will be received at this office until noon on Monday, the 2nd day of July next, for Timber Berths in the North-West Territories, situated on the Moose Mountain, in the District of Assiniboine, and on the Bow River and its tributaries, above Fort Calgary in the District of Alberta.

Sketches showing the positions, approximately, of these berths, together with the conditions on which they will be leased, may be obtained at this Department, or at the Crown Timber Office, Winnipeg.

LINDSAY RUSSELL,

Deputy of the Minister of the Interior,
Department of the Interior,
Ottawa, 18th April, 1883.

MILLER BROS. & MITCHELL



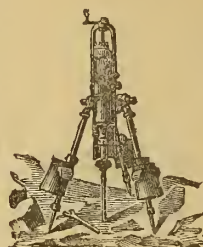
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 purchaser by applying at the Office of

THE CANADIAN MINING REVIEW

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Parties offering crystals for sale will please mention the
 colour, length and diameter—large ones preferred.

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PROPERTIES EXAMINED AND ANALYSES MADE OF ORE OF EVERY DESCRIPTION.

A Competent Expert is permanently engaged for the purpose of making Unprejudiced Reports on all Mines placed
 in our hands for Sale, such reports being at all times open to intending purchasers for examination.

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 Gold and Silver Mines, and Marble and Sand-
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The mining rights on S $\frac{1}{2}$ of Lot
 No 11, in the 8th range of Tem-
 pleton. The mineral is of the finest
 quality of fibre and in large quan-
 tity. Specimens may be seen and
 particulars and price ascertained at
 the office of the MINING REVIEW.

FOR SALE,**White Marble Quarry on Calumet**

Island.
 At this quarry there is an inex-
 haustible supply of most beautiful
 white marble. Price \$800. Sam-
 ples to be seen and information ob-
 tained at the office of the MINING
 REVIEW.

PHOSPHATE PROPERTY

In the Township of Portland West,

FOR SALE.

Lots 25, 26, 27 and 28, in the
 3rd range. Some excellent surface
 shows have been uncovered on these
 lots and only require capital for de-
 veloping. Price and particulars
 given at the office of the MINING
 REVIEW.

TIMBER LIMIT

ON LAKE WINNIPEG

FOR SALE.

50 Square Miles.

This limit will be very valuable.

Apply at the office of the MINING
 REVIEW for price and particulars.

FOR SALE,

PHOSPHATE PROPERTIES IN THE TOWNSHIP OF HULL.

MINERAL RIGHTS.

Lot No. 15, in the 7th Range.	
" " 14, " 8th "	
W $\frac{1}{2}$ of N $\frac{1}{2}$ " 6, " 11th "	
S $\frac{1}{2}$ " 2, " 11th "	
S $\frac{1}{2}$ " 12, " 11th "	
S $\frac{1}{2}$ " 13, " 11th "	
Lot " 1, " 12th "	

For particulars and price apply at
 the office of the MINING REVIEW.

CANADIAN MINING REVIEW

VOL. 1.—No. 9.

OTTAWA, JULY, 1883.

VOL. 1.—No. 9

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OFFICE:
UNION CHAMBERS, 14 Metcalfe Street.

The CANADIAN MINING REVIEW is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts as well as others interested in Canadian Mineral Lands are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 20th of the month it is to appear.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

CANADIAN MINERS IN THE COUNTY OF OTTAWA.

Of the total output of Phosphate for the year, it is noticeable that about 60 per cent. will have been mined by Canadian firms, the principal contributors to which are Messrs. J. A. Gemmill & Co., Haldane & Co., McLaurin & Co., Gillespie, Moffatt & Co., Jackson, Rae & Co., J. H. Post & Co., Adams & Co., McLaren Bros., and W. A. Allen & Co. The mines owned by these firms are situated in the Townships of Wakefield, Templeton, East and West Portland and Buckingham; they are all very valuable properties, but the most productive

of them are those owned by Messrs. W. A. Allan & Co., and McLaurin & Co., and from them an almost unlimited quantity of the highest grade ore can be raised. This season's shipments by both these firms will yield 85 per cent. of phosphate of lime, and have commanded the highest prices. It is very important that miners should be careful to have their phosphate well cobbled and brought to a high standard before shipping. By this means they will establish a reputation for their mines and create a preference for their output. Carelessness on this point is frequently attended by serious results, if one shipment fails to come up to the standard, the buyer will become prejudiced in his future dealings with the shipper, and the mine will be unfavourably advertised. A case of this kind has been brought to our notice this season and has resulted prejudicially to the owner of the mine, who asserts that after the delivery of his output at the point of shipment it was mixed with a quantity from another mine of a lower grade, the buyer, however, will not admit that such is the fact, and no settlement of the case has yet been arrived at.

AMERICAN CAPITALISTS

Visit their Phosphate Mines in Ottawa County.

On July 10th, the following names were registered at the Russell House, Ottawa:—Messrs. W. H. Williams, W. White, C. S. Henry, F. Platt, Jos. A. Marsh, B. H. Campbell, W. R. Bailey, J. N. Galway and General Jordan, (one of the Editors of the *N.Y. Mining Record*). All these gentlemen, with the exception of General Jordan, are Directors or

Stockholders in the Union Phosphate Mining and Land Company and were *en route* to their property in Portland West, few of them having ever before visited the phosphate district of the County of Ottawa. Leaving the city on the following morning, by the Canadian Pacific Railway, they reached Buckingham Village at 9.45 a.m., and proceeded thence by steamer 18 miles up the Aux Lièvres River, arriving at the company's dock about noon; here they were joined by Messrs. J. E. Smith and Wm. McIntosh, managers for the company, and escorted by them to the mines, where they were afforded an opportunity of witnessing a large force of miners, carpenters and other mechanics and workmen busily engaged in their several occupations. The piles of phosphate at the mouth of the pits, the machinery that has been erected and the buildings that have been constructed presented a scene such as few of the visitors had looked for. That the property owned by the "Union" Company is a valuable one is indisputable, and as the men entrusted with the supervision of mining operations are conspicuous for their energy and ability as well as for their practical experience in mining Canadian apatite, it is but reasonable to predict prosperity for the company, and a good dividend in the near future. The property of the company, covering an area of 1,300 acres, in the Township of Portland West, was purchased from Mr. Thomas Preston, of Orange, N.J.; it is divided into two locations known as the "Dugway" and the "Star Hill," and the preliminary work was not begun until the first week in April of this year; since then the following improvements have been made:—at the "Dugway," a boarding-house, 37 by 18, two stories high, has been erected; at the "Star Hill," there is another two story building 50 by 24 feet, with 24 by 18 feet, and wash-room 20 by 16 feet,

capable of accommodating one hundred men; a commodious stable, a storehouse and blacksmith's shop of large dimensions. The buildings are all constructed in a workmanlike manner, of seasoned timber and lumber, with a view to comfort, convenience and permanency. There are also at the mines, 2 derricks, 2 steam drills and hoists (manufactured by Graydon & Denton, N.Y.), and a 20 horse power boiler from the Ames Iron Works, Oswego, N.Y. The company has also built two substantial docks, one at a point on the Aux Lièvres River, a mile and a quarter from the mines, and the other at Buckingham Village, three miles from the railway station. A waggon road has been graded from the mines to the river bank (1½ m.), on which there are some substantial bridges, and one of the company's managers is now purchasing material for the immediate construction of a tramway from the mine to the upper dock. In the absence of this tramway, the output, which at present amounts to about 600 tons of high grade ore, will be forwarded to the river in wagons, and thence by scow to Buckingham Village, where it will be again loaded into wagons and carried to the railway station. It must naturally appear that this mode of transportation and the frequent handling of the mineral would constitute a great additional expense to the cost of mining, and so it does (about \$2.50 per ton), but the day is not far distant when there will be railway communication from the mines, and in the meantime miners must be content with present profits. The Union Phosphate Mining and Land Company is composed of a body of American gentlemen, whose positions in the commercial world of the United States is sufficient guarantee of their ability to prosecute operations with profit to themselves and others interested with them. On the return to Ottawa of the above named gentlemen, after

their visit to the mines, they expressed themselves greatly pleased with what they had seen and more than satisfied with their investment.

AMERICAN MINING COMPANIES Operating in Ottawa County.

THE AMERICAN PHOSPHATE MINING AND LAND COMPANY

was organized in January, 1882, and has carried on active operations in the Township of Templeton since September of the same year. In the early part of this season the company shipped 400 tons of first quality phosphate direct to London and 200 tons are now at the mines awaiting shipment. The property owned by this company is distributed over the Townships of Templeton, Portland East and Loughborough, and covers an area of 900 acres of carefully selected mineral lands. In the last two mentioned townships no work has yet been done beyond prospecting, but it is the intention of the local managers to extend operations during the present season. The company, whose head-quarters are in Philadelphia, has for its President Mr. J. Marshall Stoddard, Secretary and Treasurer, Mr. Fred. L. Pitts, both of Philadelphia, with five Directors, representative commercial men of Philadelphia and New York.

THE INTERNATIONAL MINING AND LAND COMPANY

is not yet engaged in active operations. The company's property consists of 1,700 acres of phosphate land situated in the 11th and 12th Ranges of the Township of Templeton and in the 3rd Range of Portland East, and was purchased by a syndicate from the Quebec Government in November, 1881, at auction. In January, 1883, the present company was organized and assumed the above title. With the disappearance of the snow last spring prospectors were engaged to thoroughly examine the several locations. The officers of the company state that many valuable deposits of apatite have been discovered and that they have reason to be satisfied with their purchase. They are making preparations to begin mining at an early date, when an opportunity will be afforded to test the extent of the deposits. Mr. Willis P. Hazzard and Mr. A. G. Elliot occupy the positions of President and Secretary, respectively, and the Board of Directors is composed of gentlemen of high standing. All the officers are business men of Philadelphia, where the company has its headquarters.

THE DOMINION PHOSPHATE MINING COMPANY,

incorporated under the Canadian Joint Stock Company's Act, is virtually an American organization, with Mr. T. C. Keefer, of Ottawa, and Mr. A. F. Riddell, of Montreal, Canadian Directors, on a board of seven, the other five being residents of Fanwood, N.J., and Brooklyn, N.Y. The Company's property, situated in the Township of Portland East, is a very valuable one and is being successfully operated by a New York firm of contractors. To put the mine in proper shape for future development a considerable amount of dead work was necessary, the contractors have made an open cut several hundred feet in length, 10 feet wide and 40 feet deep running into the Mountain towards the main body of phosphate, and have crossed several minor veins. They have now reached the objective point and are taking out a large quantity of mineral daily. To make this cutting has required the expenditure of considerable money but now that it is accomplished the advantages it affords will be felt by the contractors in their mining operations hereafter.

THE UNION PHOSPHATE MINING AND LAND COMPANY

has on its Board of Directors men of influence and capital from the principal cities of the United States. New York, Philadelphia, Cincinnati, Detroit, Chicago and Kansas City being all represented. This company is carrying on active mining operations in Portland West, and a full description of its property will be found in another column.

THE "HIGH ROCK" MINE

adjoins that of the "Union" Company and is one of the most productive properties yet developed in the county. It is owned by an English company and has been successfully worked by them during the past three years. Quite 10,000 tons of high grade ore have been shipped from this mine and it continues to yield liberally under the management of Mr. A. McIntosh.

PHOSPHATE MINING.

This comparatively new Canadian industry continues to attract much attention at home and abroad, more particularly in England, France and the United States, and during the past month a number of capitalists and experts from these countries have visited the mines in operation in Ottawa County, and have examined many undeveloped properties, with a view to engaging in what has been proved to be a very profitable investment. Those of them who have devoted sufficient time and patience to make a searching examination of the phosphate bearing district of the county have satisfied themselves that the quantity of apatite, existing in paying deposits, is enormous, far exceeding

anything they had anticipated. That this conclusion is a correct one there can remain no doubt, and it has given rise to careful enquiry into the question of supply and demand. England and Germany have been, and still are, the chief bidders for Canadian mineral phosphate, and in each of these markets a ready sale can be found for a much larger quantity than this country can hope to produce for years to come. In the United States also a considerable quantity has been used, and some small lots have been shipped to Denmark. The experience of shippers heretofore has been that better prices can be procured in Germany and Denmark than in any of the other foreign markets, but the uncertainty of procuring cheap and direct tonnage from the Montreal or Quebec ports to those countries stands as an obstacle to making contracts ahead. Recent advices from London and Liverpool are of a very satisfactory nature and should suffice to counteract the disquietude occasioned in the minds of miners by the discouraging theorizing of the Montreal buyers, the majority of whom are bears, and naturally so. Some of the more extensive operators are having their eyes opened to the fact that they can realize much better prices by shipping direct to the foreign market, wherever it may be, than by dealing with Canadian middle men; others will see the advantage of this, and if the Montreal shippers do not evince a disposition to deal more liberally they will soon have to content themselves with handling small lots, the output of properties in the hands of irresponsible men.

The exports of phosphate from all parts of Canada during the past fiscal year amounted to 17,181 tons, distributed as follows:—Great Britain, 13,197 tons; to the United States, 2,080 tons; to Germany, 1,469 tons; and to Denmark, 435 tons. This year's shipments will be somewhat in excess of those of last year, but were they to be double or five times the quantity it would in no manner effect the current prices abroad.

Quotations.

During the past month there has been no perceptible fluctuation in value of Phosphate, though some sales of small lots have been reported at low figures. Such lots, however, were not guaranteed and were the output of unimportant mines owned and operated by men who had been compelled to realize on almost any terms. Owing to the scarcity of tonnage offering at present from Montreal to Liverpool the local buyers have not been bidding and, though the foreign market continues firm at 1s. 3d. for 80 per cent., shippers are not anxious for consignments.

Fifty thousand dollars' worth of copper ore has been shipped this year from Canada to Great Britain.

Introducing Steam Power.

That phosphate miners in Canada have awakened to the advantages of employing steam power is made apparent by the fact that steam-drills and hoists are in use at no less than five of the more important mines in Ottawa County. A fifteen horse-power boiler, steam-drills and hoists have recently been shipped to one of the mines on the Aux Lievres River by the manufacturers, Messrs. Millar Bros. & Mitchell, of Montreal, and have been erected under the personal supervision of the senior member of the firm. Everything has the appearance of excellent workmanship and will doubtless perform good work.

Stock Watering Kettles.

At a recent meeting of the Farmers' Club, at Elmira, N.Y., a newly designed kettle for stock-watering purposes was exhibited and highly approved of.

Many of the mining companies of this continent would do well to provide themselves with these useful vessels.—[Ed.]

A Disappointment.

A specimen of Asbestos, of rather an inferior quality, was brought to Ottawa recently by a man who claimed to have discovered a vein on his farm and described it as being of unusually large dimensions. A careful examination of the locality by an expert resulted in no Asbestos of any consequence being met with and the owner of the property could not direct him to the spot from which he professed to have taken the specimen referred to.

HAYCOCK IRON MINES.

The London *Iron Trade Exchange*, in its number of July 7th publishes in full Mr. R. Howson's report on the Haycock Iron Mine dated Middlesbro, 21st May, addressed to the Directors of the Ottawa Iron and Steel Manufacturing Company, and says that the report on the Haycock Iron Mines, Timber Limits, etc., which has been specially prepared by Mr. Howson, the well known expert, confirmed as it is by other authorities, needs no comments beyond stating that the Ottawa Iron and Steel Company appears to have almost unlimited resources for the production of the best qualities of charcoal steel and iron.

Mr. Howson made a personal examination of the various properties of the company in April last and expresses himself satisfied that the representations made in former reports thereon are of a *bona fide* character. His report is very complete and intelligent and, in the main, coincides with the most favourable reports of Professor Chapman and Mr. Birkinbine—he enters fully into detail for further operations and concludes his report by stating that he had several interviews with Professor Chapman and Mr. Birkinbine, both of whom

gentlemen of high character, and that he agrees with them that prompt and energetic action, combined with careful management, the property of the Ottawa Iron and Steel Company will prove to be source of considerable profit.

Mr. Fraser, the Secretary of the above company has returned within the last few days from England where he has been for the past six months endeavouring to place the company's property on the London market. He states that he has succeeded in organizing a new company with a capital of £350,000, that they will begin operations this fall and that it is the intention of the company to engage in the manufacture of steel rails.

The Robert's Iron Company of Robertsville, Frontenac County, has suspended operations in its mine owing to the depression of the iron trade and the consequent falling off in the demand for ore on the other side of the border. This company has for some time past been raising about 100 tons of ore daily and employing a number of experienced miners. It is to be hoped that this trade may soon revive in order that active operations may be resumed.

ECONOMIC MINERALS

IN THE
PROVINCES OF ONTARIO AND QUEBEC.

COPPER.

Copper constitutes one of the most important of the mineral treasures of the Dominion of Canada, and is destined to occupy a very important rank among its resources. Its ores are distributed over vast tracts of country in Ontario, in the Eastern Townships of Quebec, in Nova Scotia, British Columbia, and traces of it are met with in New Brunswick.—Thus writes Dr. Small in his hand-book for 1882.

ONTARIO.—The richest copper producing section of this Province is that embraced by the northern shores of Lakes Superior and Huron. The north shore of the former, especially, is very rich in this mineral, where it frequently occurs in the form of native or metallic copper. Excavations of aboriginal mines are occasionally met with, and the stone implements used are also found in them. An open cutting, supposed to have been made by the early French explorers, was found near Mamainse Point, the marks of the drills being still visible, and old shafts are here and there met with, but its history is completely lost. On the south shore of Bachewaning Bay, the cliff is stained with blue and green carbonates of copper; at Mamainse Point, veins of gray sulphurate occur, and prisms are met with nearly filled with native copper; at Pointe Aux Mines,

numerous veins occur; and at Mica Bay considerable money was spent in testing a vein, which, though rich in ore, was not lasting enough to be productive of results that would warrant a continuance of mining operations. A number of localities on Michipicotin Bay and Island are rich in copper; among them is Fletcher's Mine, from which large quantities of ore have been extracted, and veins appear along the coast east and west of Otter Head, The Island of St. Ignace, Black Bay, Flour Island, Simpson's Island, Point Porphyry, Edward's Island, Thunder Cape, Prince's Bay and Spar Island, on the north-west shore, are all rich in copper, native copper being abundantly found in these localities. Pigeon River and the district south-west of the Kaministiquia River give evidence of the existence of copper in large quantities. It is asserted that the Superior district contains the most extensive copper deposits in the world, capital being the one thing necessary for their development. Along the shores of Lake Huron, copper is abundant, in fact no very large area within this region is destitute of copper-bearing veins. The Bruce Mines, the Wellington Mine, and the Huron Copper Bay Mine are here situated, and have produced a large amount of very rich ore. Numerous veins occur at the mouth of Whitefish River, and at Spanish River, and the district contiguous to it; at Echo Lake, on the east branch of Cariboo River, at Limestone Point and at Root River, there are abundant shows of copper. The ore found at the above named points is chiefly pyrites and yellow sulphurets, and the indications are rich enough to lead to the belief that ere long the Lake Huron district will be one of the most important mining sections of this country.

In Eastern Ontario, in the County of Hastings, in Hungerford Township, and Anglesea, west of the Addington road, and occasionally scattered elsewhere, traces of copper in the form of pyrites have been found, but of no economic value as far as known at present.

QUEBEC.—In Eastern Canada, the native copper, which is so abundant in the Superior district, is met with but in few cases. Sir William Logan describes the copper deposits of this part of Canada as similar in point of structure and mode of occurrence to those of Norway and Sweden. In some of the localities in this Province the ore met with is a sulphuret, but these veins are seldom continuous for great distances. At the outset of copper mining in this section a great rush was made for mining rights; companies were formed, the majority of which sank a great deal more money than they could afford and had to yield to the pressure of the times before realizing any return on their outlay. Despite all this there has been sufficient development to prove

that in several districts copper mining could be carried on successfully. The extraordinary number of 557 locations have been enumerated in the Eastern Townships where copper exists and has been traced. The Acton, the Harvey Hill, the Prince of Wales, the St. Francis and the Lower Canada Mines, as well as one at Garthby, were being worked at one time. The Coldspring, the Balrath, the Brompton Gore, the Ascot and Belvedere; Victoria, Reid Hill, Warrington, Griffiths and Ham Mines gave good evidences of copper, but were respectively abandoned. Copper has been traced through the Townships of Potton, Bolton, Stakeley, Oxford, Brampton, Melbourne, Cleveland and Shipton; and in numerous other localities, such as Wickham, Durham, St. Flavien, Sutton and Halifax, the existence of ore, in the form of sulphuret, rich in copper, has been discovered. In the Ascot district the Hartford, the Crown and the Albert Mines have been for some time worked, and the Sheffield and Hepburn Mines were opened under favourable auspices last year.

The Eastern Townships ores demand a peculiar metallurgical treatment, and to separate the copper gangue they require additional power and more sulphurous ore in the smelting works. It is stated that the quantity of fuel required by the present mode of treating the ores is such that the richer ores must be carried to the vicinity of coal; hence it is not unlikely that these from Eastern Canada will eventually find their way to the coal fields of the lower Provinces.

MICA.

Mr. H. G. Vennor in his published letters, thus speaks of this valuable mineral:—

"The constant new uses to which mica is being put year by year, keeps it continually in demand and ensures a good price always for a good article. A "good article" in mica must possess at least two qualities, viz., clearness of colour and size of crystals, characteristics not always found together. Clearness of colour alone is of little importance, if the size is insufficient; and the latter by itself is nothing without the former.

Mica occurs all through the stratified upper portion of the Laurentian series of rocks, but chiefly in a finely divided and disseminated form in the gneiss and schists. In fact it is as much a component part of the rocks as is the quartz, feldspar or hornblende.

The economic deposits, however, are all towards the summit of the series and in connection with the phosphate of lime rocks; but by some unaccountable process or agency the mica in these deposits has been "faulty" from its birth. For besides being in the majority of instances of a very dark colour it is affected by "joints" or cleavage

planes at right angles to what may be termed the *plate cleavage*, which being often accompanied by a slight displacement or dislocation, produces a very uneven natural fracture. Wrinkles or corrugations likewise spoil very many of the large crystals and render them entirely unfit for the market. Hence, out of one hundred and more localities examined, where mica occurred in considerable quantities, only some two or three were found to yield anything like a suitable article."

As illustrative of the quality of mica required by mica men we give the following from the *Manufacturer and Builder* of a recent date:—

"This mineral, simple in itself, is but an aggregation of infinitesimal crystals, which by some unknown natural process have united in a massive form, with a laminated structure capable of being subdivided on a plane with its axis to such an extent that one cubic inch can be subdivided by the eye into about 180 superficial inches, and the same be again subdivided by the aid of the microscope until one cubic inch of mica is made to cover four or more superficial feet. This capability of subdivision in plates or laminae is not its only peculiarity. It varies from transparency to translucency."

The demand for mica, for stores alone, is greater than the supply, thus causing an uninterrupted demand. To the uninformed it may appear strange, but mica is to-day a staple article of commerce. (The fact that mica in stores must be replaced almost annually, creates a steady demand. Recently has been patented its application to shoes, whereby soles at a trifling expense are rendered waterproof. And whenever the quantity of mica produced is sufficient to supply the demand, and the market price is reduced, then new uses and applications of it will arise. As a lubricator it stands pre-eminent, owing to its non-frictional qualities.

It will be thus seen that in mica mining we have an industry worthy of development, and one which requires no expensive manipulation of the product subsequent to excavation.

The largest and altogether the most important deposits of mica yet discovered in Canada occur in Ontario. Here the mica is without the usual association of phosphate of lime, and is of an unusually clear colour and suitable size.

In Ottawa County, Province of Quebec, the deposits are innumerable, and mica constitutes a large part of the debris thrown out of nearly every opening made in search of phosphate, but the majority of this is worthless stuff.

All of the large-plated mica occurs in one particular plane of bedding or horizon, which would appear to lie just between the apatite and plumbago-bearing rocks.

The neighbourhood of Grenville,

abounds in mica of fair quality and as no deposits of phosphate of lime of any importance have yet been discovered in this direction, it would seem to indicate that this latter economic belongs to a higher portion of the rock series, which has not been deposited to any extent in this section. In fact, this truth has already been established in Ottawa County, the mica-producing rocks always having been observed to "come in" before those in which the phosphate of lime occurs.

GALENA IN FITZROY.

It has been rumoured in Ottawa that a property was purchased not long since in the Township of Fitzroy by some American gentlemen. This property is said to be very valuable owing to the presence of an extensive deposit of galena having been discovered thereon, supposed to carry a large percentage of silver. It is stated that \$16,000 is the price that was paid and that it is the intention of the present owners to begin mining operations at once.

We cannot vouch for the correctness of these statements and will be pleased to receive authentic information in verification of current rumours. —[Ed.]

GOLD MINING IN WESTERN CANADA.

(From the Montreal Star.)

The Lake Winnipeg and the Keewatin Gold Mining Companies have recently obtained their charters from the Manitoba Legislature. Mr. H. L. Borden, the former company's superintendent, was in the city the other day, en route for Nova Scotia, where he goes to purchase machinery and engage miners for both companies. He was intercepted by a Star reporter, who obtained from him the following information regarding these two enterprises. "Both companies are composed of Canadian and American capitalists, the Board of Directors of each being the same. The subscribed capital of each is two million dollars. The Lake Winnipeg Company's mine is situated on the Big Black Island, in Lake Winnipeg, about seventy-five miles north of the mouth of Red River. The island is about nine miles wide and thirteen long, and the Saskatchewan steamers pass it regularly on their route, thus affording easy communication with Selkirk via the branch of the Canadian Pacific Railway from Colville Landing. The company began work last fall and have sunk a shaft to a depth of 56 feet all the way through "pay rock." Operations have not yet gone far enough to enable a calculation to be made of the probable extent of the lode, but where it crops out at the bank it is about 20 feet deep. The company intend to sink another shaft further back, to strike the lode about 200 feet below the sur-

face. The assays which have been made of the ore yielded from \$90 to \$150 of gold per ton; a single, very rich specimen gave \$300 per ton. The ore will have to be reduced by what is known as the "washer" process; there is some free gold in the mine, but a great deal is refractory ore.

"When will you be ready to begin to work the mine?"

"Everything is waiting for the machinery. The company have constructed a wharf at which any steamer on the lake can land, and all the necessary buildings for working the mine—boardinghouse, machine and blacksmith shops, etc., are built; but we won't begin to take out ore until the other shaft has been sunk. I don't think it pays to commence operations before we are fully prepared."

"Do you expect to get the machinery you require manufactured in Nova Scotia?"

"The purpose is to get all the machinery we can in the Dominion, and we hope to find what we require in the gold districts of Nova Scotia. I am also going to engage miners there, where they are to be found in large numbers, for men who have had the experience are the most profitable to employ."

"By whom was this mine discovered?"

"By Messrs. Anderson and Guest. They also discovered iron and abundance and of excellent quality on this island, part bog ore and part hematite. There are indications of coal in the island, too."

"What about the Keewatin Company's mine?" "It is on Hay Islands in the Lake of the Woods, nine miles south of Rat Portage, where the Canadian Pacific Railway touches the lakes. This is one of the richest mines in the Dominion. There are at least some thousands of tons of ore right inside of it. It crops out of the side and you can hardly pick up a piece of stone but you can see free gold in it. The lode can be traced for about half a mile very plainly. About a thousand feet distant from these croppings, the company have sunk a shaft 62 feet deep; and the ore looks better the deeper they go. This can be made a paying mine right away, and it is intended to put up the mill the first thing as soon as it reaches the place. The company expect to pay a dividend on the first operations, besides paying all the expenses of working the mine. It is hoped that the mill will be running in the course of three or four months from now, everything else being ready for operations, and about four hundred tons of ore having already been taken out."

"What are the prospects for mining generally in Manitoba?"

"The only obstacle in the way of the speedy and extensive development of the mineral resources of the province is the lack of confidence on the part of the men who have

the money to invest, and that is a serious difficulty. A great many persons speculated largely in land during the great boom about a year and a half ago, and many of them were badly bitten, too. The capital invested in this way is now locked up, while those who have available funds are afraid to invest it. There is a great deal of the country yet unexplored, which, I believe, will yield immense mineral wealth. The native Indians are continually bringing in specimens of gold and silver ore astonishingly rich, but they cannot be induced by any means to tell where the ore is taken from. It is, no doubt, somewhere between Lake of the Woods and Lake Winnipeg. The country is now being slowly explored, and shows a large mineral belt. The other mines in Manitoba already in operation are in a prosperous condition, and their owners seem confident of success; all they want is capital to develop them."

Captain Robbins, President of the Eureka Mines, Nevada, visited Port Arthur recently, and, it is said, while there, representing the Bullion Club, of New York City, he purchased the property at Clearwater Bay, known as the "Joe Thompson location" for \$35,000. It is further stated that Captain Robbins will at once erect an \$80,000 stamp mill at Rat Portage for his own use, and capable of working up the output of other mines in the district.

Mr. Langdon, of Langdon, Shepard & Co., contractors on the Canadian Pacific Railway, arrived in Winnipeg about the middle of July from the end of the track, with a car load of curiosities. He brought a specimen of lignite coal of a bright, clear character, some of which had been used for the engine driving piles in the Saskatchewan River. It burned excellently, retaining its character of forming no clinkers. Mr. Langdon will experiment with the specimen he has with him when he reaches St. Paul and, if it comes up to his expectations, a car-load will be forwarded at once.

In addition to coal, he brought some very interesting specimens of petrified pine, showing perfect formation of the ancient tree, clinging to which there were clusters of quartz, showing indications of gold. A quantity of buffalo bones and some very handsome antlers formed a portion of this curious cargo.

Early in July Saskatchewan coal was tested on the Canadian Pacific Railway and was pronounced to be of very superior quality for steam purposes. It is said to burn without forming "clinkers."

Negotiations are afloat to organize a company to engage in extensive coal mining operations in the Souris district. The owners of the location are sanguine of success.

GOLD MINING ON THE LAKE OF THE WOODS.

(From our Special Correspondent.)

RAT PORTAGE,

July 24th, 1883.

Your correspondent has just had an opportunity of visiting some of the gold mines of the Lake of the Woods, and has obtained the most recent reliable information in regard to the others. The following notes will, therefore, give a pretty good idea of what has hitherto been done, and of the present condition of mining up here.

I may premise that there is now less activity than existed two months ago, but this arises from the difficulty of obtaining money in Winnipeg, where the mines are owned, and not from any failure or diminution of confidence in the mines themselves. Most of the discoveries so far made are situated around Big-stone Bay, in the northeastern part of the lake, and near Clearwater Bay, in the northern part. Hay Island, which has become well known on account of its gold-bearing veins, lies on the south side of the former bay.

The Winnipeg Consolidated Mine is on the south-eastern side of Big-stone Bay, about twelve miles from Rat Portage. The vein, including some green schist, is from two to four feet wide and runs about north-east. The main shaft is down 105 feet. At 80 feet from the surface an adit is driven 30 feet N.E., and 20 feet S.W. The ore is a finely granular porous quartz containing copper and iron pyrites, with free gold. The accompanying schist also holds gold. At the mine are a wharf, shafthouse, boarding-house and stamp-mill containing a battery of five stamps in position, and another ready for putting in a similar number. In April, the mill made an experimental crushing of about 17 tons which yielded some \$45 to the ton, and the tailings were found to contain \$16 to the ton, the loss having been due to the imperfect amalgamation on the new plates and the want of other means of saving the gold. A grinding pan and amalgamator have just been put into the mill. Work was begun at this mine in October, 1882. About 40 men were employed in April and May, but the sinking and driving are now almost at a stand still from the cause already mentioned.

The Canada Mining Company's vein is a continuation of the Consolidated. They are working with five men and are down about 30 feet.

The Lake of the Woods Company are working a further continuation of the same vein. Their shaft which is down 20 feet, is all within the walls of the vein, which is here about 8 feet wide.

The Keewatin Mine is on the north end of Hay Island. A shaft

as been sunk here to a depth of about 60 feet on a vein four inches wide. Near the shaft a bunch of quartz has been discovered carrying free gold and measuring about 20 feet in diameter. Formerly this company employed about 20 men, but their staff is now reduced.

The George Heenan Mine is situated on the east end of Hay Island between the last mentioned mine and the Consolidated. Here three shafts (the deepest only 20 feet) have been sunk on a narrow but rich vein, the quartz showing many small nuggets. About half a dozen men are employed. A quartz vein carrying considerable copper pyrites intersects the gold vein.

The Boulder Island Mine, situated on a small island in the middle of Big-stone Bay is abandoned at present.

The Minnisabic Mine is on another island in the same bay, midway between Boulder Island and the Consolidated Mine. Two shafts, now 25 and 15 feet respectively, are being sunk by contract. Two veins occur here, one running N.E., and the other due N. They measure 8 and 18 inches, and both contain free gold.

The Canadian Comstock Mine is at the head of Pine Portage Bay on the north side of Big-stone Bay. The vein is known as "The Whale." It is from 3 to 10 feet wide, and lies in the bottom of a little canyon, and so far only open cutting has been carried on in the bottom of it. The largest stamp-mill in the region has been erected at this mine. One battery of five stamps has been placed and everything is on hand for three more of the same capacity, or 20 stamps in all. The machinery is by Fraser and Chalmers of Chicago. About 15 men are employed at the mine and mill. This mine is owned by Messrs. Dobbie and Palmer.

The International Mining Location, owned by Messrs. Wm. Young and D. Morrison is on a small island in the bay next east of Pine Portage Bay. Here a vein 2 feet wide shows fine gold, but it has not yet been worked.

The Argyle Mine is situated on a point in Clearwater Bay, lying three miles south-east of Lake Deception. The vein is from 1 to 3 feet wide and runs east and west. A number of pits or shafts have been sunk, the deepest only 25 feet. At one time the company employed about 30 men, but they are now working with a smaller force, in sympathy with the general retrenchment. The 10 stamp mill, which is erected here for a short time on the ore which had been taken out. There are also two Frue Vanners and a Blake stone-breaker. Captain F. S. Miller is President of the company and General Manager of the works.

NEW DISCOVERIES.

It is currently reported that a phosphate deposit of more than ordinary importance has been discovered by prospectors in the 11th Range of the Township of Hull, near Kirk's Ferry.

New discoveries of mica are daily reported, and some of the deposits are capable of yielding an almost unlimited quantity, but the quality of the mineral is very inferior. A few specimens of really good quality of mica have been sent to us, but it is said not to occur in paying quantity.

Another rich lead, measuring 6 inches in width, is said to have been quite recently discovered at Chezetcook, in the vicinity of the Oxford Gold Mining Company's claim. During last year important discoveries were made in this district, to the north and west of the Oxford property, by Mr. Stather, Mr. McKay and the Messrs. Vaughan.

It is stated that in the neighbourhood of Sooke, Vancouver, B.C., a vein of copper ore has been traced a distance of 20 miles, and that a company has been organized to work the lode. So far the names of the owners of the property and the promoters of the company, as well as a description of the ore, have been withheld.

Early in the month of June information reached us of an important new discovery of gold in Halifax County, N.S. We have endeavoured to obtain definite information on the subject, but have not succeeded in gathering more than the following bare facts. The discovery has been made on the DeWolf property, in close proximity to the well known Rose lead of the Montagu Mines. Three veins measuring 7, 10 and 35 inches, respectively, have been found at a depth of 12 feet from the surface, and are said to bear indications of unusual richness.

The *Chicago Mining Review* of July 19th refers to the discovery of a copper lead on Hay Island, in the Lake of the Woods, measuring 30 feet wide.

The same Journal, in its number of July 12th, calls attention to reported coal discoveries in the County of Ottawa. No report of this nature has yet reached us. The non-existence of coal in the Provinces of Quebec and Ontario has long been an established fact; but being situated favourably in their proximity at all points to other carboniferous regions, and the facility of conveyance afforded by the Lakes, Rivers, Canals and Railways of the respective Provinces, it is easily procurable, and the deficiency is supplied by the vast areas of coal districts in the Maritime Provinces and on the Pacific Coast.—[Ed.]

PROJECTED RAILWAYS TO PENETRATE MINERAL SECTIONS OF CANADA.

The Kootenay Railway and Transportation Company.

During the last session of the British Columbia Legislature a bill was passed incorporating the above company and donating 750,000 acres of land to its promoters, including all mineral lands other than gold or silver. This railway will penetrate a section of the Province known to be rich in mineral and farming lands, and the only reason why it has been neglected, heretofore, has been its inaccessibility. The object of the railway is to connect Kootenay Lake with the navigable waters of the Columbia River and to act as a feeder to the Canada Pacific Railway. That the company's charter is a very valuable one, it is admitted on all sides, but the fact that the land grant and franchise have fallen into the hands of Americans has created much local dissatisfaction, so much so, that on the 23rd of April a public meeting was held in the City Hall, at Victoria, B.C., for the purpose of considering the grounds upon which exception was taken to the passing of the Act of Incorporation. The meeting was largely attended and resolutions then passed were submitted on the 28th of the same month to the Lieutenant Governor for transmission to Ottawa. The meeting protested against the Act of the Local Legislature and invoked the intervention of the Dominion Government. Since then the matter has been fully commented on by the press, one journal going so far as to state that the charter had been disallowed. That this has not been done is apparent by the fact that such disallowance has not appeared in the *Canada Gazette*. The resolutions referred to, and many communications in connection therewith, have been received by the authorities at Ottawa, and the matter has been reported on by the Minister of Railways and Canals and the Government Chief Engineer, but no action has yet been taken. It is not in the least improbable, however, that the Minister of Justice who, with the Government Engineer, has proceeded to British Columbia on public business will, while there, discuss the question at issue with the local authorities, and it may result in certain features, objectionable in a Dominion point of view, being illminated from the bill during the next session of the Local Legislature.

That the construction of this railway will be a boon to the Kootenay district, and of much benefit to British Columbia, is acknowledged on all sides, and it is universally admitted that the Local Legislature has been most generous to the promoters in granting them the fran-

chise and in its land subsidy, but it would seem that the greatest grievance the petitioners have exists in the fact that the successful applicants are Americans.

It appears that these gentlemen are personally interested in the development of the district into which the railway will penetrate, having become owners of the largest deposits of silver bearing galena yet discovered on the Pacific Coast, situated on the east side of Kootenay Lake. Therefore, nothing is more natural than that they should seek substantial Government aid to enable them to open up a section of country in which they are so deeply interested. The company to construct the railway has been organized with \$5,000,000 capital stock, divided into \$50,000 shares of \$100 each; \$4,000,000 has already been subscribed and the balance will be allotted in California. Are there any local men capable and prepared to undertake the construction of this work on similar terms to those that have been granted to Messrs. Ainsworth? If not, then it is short sighted policy that will permit sentiment or prejudice to delay the opening up and development of the natural wealth of our Pacific Province or of any other Province of the Dominion.

Ottawa and Gatineau Valley and Ottawa Colonization Railways.

The contract for the construction of the Ottawa & Gatineau Valley Railway has been awarded to Messrs. Macdonald, Bray & Jones, of Toronto, and work will proceed about the first week in August, the entire line to Desert to be finished within three years. The Ottawa Colonization Railway will be under construction within a few weeks and vigorously prosecuted thereafter. The company of course depends upon the active assistance of property owners and taxpayers and, after making the regular location survey, will ask the Townships to manifest their desire to get a railway by granting small bonuses, and the property owners to grant right of way. We would urge every public spirited ratepayer to work indefatigably in the interest of the enterprise, as it will be the making of this portion of the country. We congratulate the promoters of the railways upon the progress already made and feel confident that success will crown their efforts.

AMBER AND ITS ORIGIN.

According to a recent volume on the flora of the amber-bearing formations of East Prussia, by Messrs. Goeppert and Menge, there must have existed in that part of Europe in ancient days a group of conifers which comprised specimens from almost all parts of the world. There were present such magnificent repre-

sentatives of the Californian Coniferae as the Red Wood, the Sugar Pine, the Douglas Spruce; the scarcely less majestic Bald Cypress, Red Cedar, Thuya and *Pinus rigida* of more eastern States; the Chilian Incense Cedar, the Parasol Fir, the Arbor-Vitae, the *Gyptostrobis* and the *Thuyopsis* of the eastern coasts of Asia; the Scotch Fir, the Spruce and the Cypress of Europe, and the Callitris of Southern Africa. The causes which led to the dispersion and extinction in Europe, in relatively recent times, of so considerable a group of coniferae would be interesting to trace out. From generations of these resin-bearing trees along its shores have been produced the deposits of amber for which the Baltic is noted. The richest deposits are situated along a strip of coast between Memel and Dantzic, but the real home of amber has been supposed to lie in the bed of the Baltic between Bornholm and the mainland. It rests upon cretaceous rocks, and consists chiefly of their *debris*, forming a peculiar mixture known as blue earth, which appears to exist throughout the Province of Samland at a depth of eighty to one hundred feet, and to contain an almost inexhaustible supply of amber. This strip of blue earth extends along the coast for sixty miles, with a breadth of twelve miles and an average thickness of ten feet. Immense quantities of amber are washed out to sea from the coast, or brought down by rivulets and cast up again during storms or in certain winds. The actual yield by quarrying is 200,000 to 300,000 pounds a year, or five times the quantity estimated to be cast up by the waves on the same coast.—*Mail*.

A Submerged Forest.

A Wonderful Formation at the Bottom of Lake Tahoe.

Carson (Nev.) Appeal,

For some years there has been a bank in Lake Tahoe, which in clear weather has generally been taken for moss formation. It lies at the right of the steamer's course between Tahoe City and Tallac, about two miles beyond Idlewild. It looked as if a lot of trees had sunk to the bottom of the lake and that moss and slime had collected there till the whole presented a wavy, semi-transparent appearance, about fifty feet below the surface. During the past few weeks the moss and *debris* have disappeared and now when the water is clear a forest of pine trees can be plainly seen, with every limb and twig perfect. Recently some fishermen went out there in a boat and, lowering grappling irons, secured several splendid pieces of the petrification. One is a pine branch about three feet long, which, when held a few feet from the eye, has the appearance of a pine branch just taken

from a living tree and apparently fresh and green, the brittleness and weight distinguishing it from the freshly cut bough.

The specimens brought to Mr. Kinney's were speedily disposed of to tourists. The largest piece was purchased by Henry Townsend of San Francisco for \$25. This is said to be the first thing of the kind ever found in the lake. The forest occupies about two acres and seems like a forest just immersed, except that its stony branches are forever still and tall weeds and vines which cluster about the trunks of the giant trees are as motionless as the rocks. No wind ever stirs this strange verdure and the birds which once sang in the branches centuries ago have given way to fish, which swarm through the forest in thousands.

A PETRIFIED FOREST.

The *Albuquerque* (N.M.) *Journal* thus describes the appearance of a petrified forest near Corrizo, on the Little Colorado River:—

"The road, at a distance of ten miles from Corrizo, enters an immense basin, the slope being nearly a semicircle, and this inclosed by high banks of shale and white fine clay. Half an hour's good driving from this point takes one to the heart of the forest. The petrified stumps, limbs, and, in fact, whole trees, lie about on all sides. The action of the waters for hundreds of years has gradually washed away the high hills roundabout, and the trees that once covered the high table lands now lie in the valley beneath. Immense trunks, some of which measure five feet in diameter, are broken and scattered over a surface of three hundred acres. Limbs and twigs cover the sand in every direction, and the visitor is puzzled as to where he shall begin to gather the beautiful specimens that lie within easy reach. There are numerous blocks or trunks of this petrified wood, which have the appearance of having been just cut down by the woodman's axe, and the chips are thrown around on the ground so that one instinctively picks them up as he would in the log camps of Michigan and Pennsylvania. Many of the small particles, and even the whole heart of some trees, have now become thoroughly crystalized, and the beautiful coloured cubes sparkle in the sunshine like so many diamonds. Every colour of the rainbow is duplicated in these crystals. The grain of the wood is plainly shown in nearly every specimen."

Siberia now ranks only barely below the United States and Australia as a gold producing country. The best Russian authorities think its mines will yield nearly or quite \$25,000,000 worth of the metal this year, and the output is steadily increasing.

How HE GOT HIS START.

The First Big Hit made by Jones, of Nevada.

Many remarkable anecdotes touching the life of Senator Jones, of Nevada, have appeared, from time to time, in the American journals. The following history of his early experience in the gold diggings has appeared in the *Washington Sunday Herald*, and may be of interest to some of our readers:—

"Jones had gone to California with thousands of others when the wonderful discovery of gold in that far-off land thrilled every hamlet and village. Among those who went to seek their fortunes there was a man named Hayward, from Vermont. He was rather the superior of his associates in education and totally unlike them in habits. They were working in pretty good pay dirt and at first had fair success; but finally one after another went away to more promising localities, until Jones and a few others, among them Hayward, were left at the old diggings. Hayward had a claim on the mountain side that as yet had shown no particular promise. Still he stuck to it. One hot summer day, when the red hills were quivering with heat, Hayward came to see Jones. Said he, 'Jones, I am very near to a wonderful vein. I know it; I feel it. But I am flat broke. I want \$2,000. With that I will make both our fortunes.' 'Now, old fellow,' said Jones, 'I have known just 1,000 men in exactly your fix. They only needed \$1,000, and sometimes \$100, to make their eternal all.' But Hayward continued. Finally Jones said 'I will give you this money. I have \$3,000 buried under the fireplace, and when the fire goes out and my Chinaman leaves I will give it out to you. But don't ask me for any more. I cannot afford to lose more than that; and, while I give it to you with the utmost heartiness, don't ask me for any more.'"

Hayward got the money and said: "When I strike it I will give you a quarter interest." One afternoon, about a month after this happened, Jones was sitting in his cabin, when Hayward suddenly burst in, as white as a sheet. "Jones," said he, "I have struck it." "Struck what?" said Jones. "I don't know what just yet," answered Hayward, "but I have struck the richest vein I ever seen." They went together to look at it, and sure enough, Hayward had struck an immense "bonanza" or pocket of almost pure gold. Jones, with his experience, saw it was the richest mine in California. They sent for Eugene Kelly of San Francisco, then a young mining expert of great ability. He pronounced it the greatest strike in his time. Hayward had found the New Amador, the richest gold mine in the world. He sold it to Wells-Fargo and some

others for \$5,000,000, and the day the sale was made he gave Jones \$1,250,000. Jones afterwards married Hayward's daughter. This is the history of the New Amador, and of the great start in life of Jones, of Nevada.

MISCELLANEOUS.

The world's production of precious metals for 1882 is estimated at \$212,000,000. Of this amount the United States produced \$87,000,000; Europe, \$21,000,000; Asia, \$16,000,000; Australia and other countries, \$88,200,000.

Leadville during the past five years has produced twenty-eight million ounces of silver, one hundred and forty thousand tons of lead, and twenty-six thousand ounces of gold, inclusive of one hundred thousand tons of ore shipped to other towns for treatment.—*N. Y. M. Record*.

A cubic inch of gold is worth \$210; a cubic foot, \$363,380; a cubic yard, \$9,797,762. This is valuing it at \$18 an ounce. At the commencement of the Christian era there was in the world \$427,000,000. When America was discovered it began to increase. Now the amount of gold in use is estimated to be \$6,000,000,000.

From surveys and calculation made by J. A. Farrington, Civil Engineer, the famous Washington Boulder, near Conway Corner, N.H. is found to measure 30 feet in height, 46 feet in length, 35 feet in width and to weigh 3,867 tons. This is the largest known isolate piece of granite in the world.—*Granite Cutters' Journal*.

The development of the coal field of Asturias has greatly advanced within the last few years. In 187 the output was 167,586 tons, and in 1882 the quantity raised amounted to 219,508 tons. With the increased demands of railway companies and industrial establishment the product will be increased beyond anything that the above figures might indicate. This may be looked for in the near future.

The burning of the lignite beds Colorado, Wyoming, Montana, and Dakota, Mr. Charles A. White says was caused by spontaneous combustion, contact at exposed places with prairie fires, or by human agency. The weight of the evidence goes to support the theory that, in the great majority of cases, the fire have occurred in a purely natural way, or spontaneously, like those which are often seen in progress the piles of refuse coal that collect about the mouths of coal mines. A large part of such burnings of lignite is very ancient, more so, perhaps, than the introduction of artificial fire upon this continent.

Herr Schell, of Grund, Germany, has reported that in the course of mining operations in the Hartz Mountains the sounds made by the firing of shots in a cross-cut were audible through the rock at a point 437 feet distant in a horizontal direction; and the dropping of a 320 pound stamp on the surface was heard in a tunnel through 571 feet of rock, the tunnel being 538 feet below the surface and under a point distant horizontally 187 feet from the stamp-mill.

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Frequent enquiries are made at his office for men who understand running Steam Drills, for Mining Captains and Practical Miners. Such men who are out of employment may find it to their advantage to forward name and address, mentioning the class of work they are qualified for, etc., to the CANADIAN MINING REVIEW, Union Chambers, 14 Metcalfe Street, Ottawa.

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For Sale in North Burgess.

Mining Rights of W $\frac{1}{2}$ of 13, in the 5th range. About 100 tons of very high grade Phosphate have been shipped from this property. Will be sold to an immediate purchaser for \$750. Apply at the office of the MINING REVIEW.

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Mining Rights on S $\frac{1}{2}$ of Lot No. 16, in the 1st Range.
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 " " " No. 26, in the 4th Range.
 " " " No. 20, in the 5th Range.

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L. VANKOUGHNET,
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 Ottawa, July 26th, 1883 }

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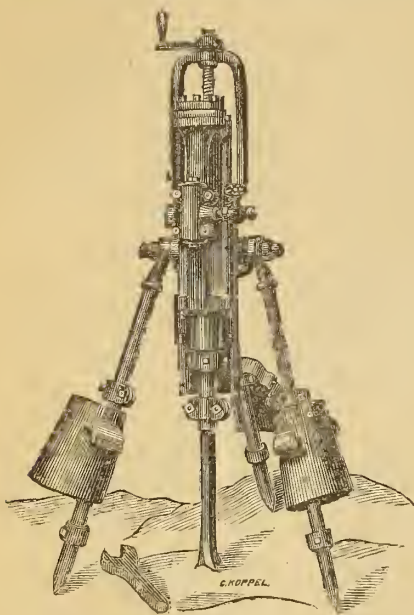
Section.	Town- ship.	Range— West.	Acres.	
3	14	23	640	
17	14	23	640	
15	14	23	640	
19	14	23	640	
W $\frac{1}{2}$ and N. E $\frac{1}{4}$	35	14	23	480
N $\frac{1}{2}$ and S. E $\frac{1}{4}$	19	15	23	480
S $\frac{1}{2}$ and N. E $\frac{1}{4}$	15	16	23	480
E $\frac{1}{2}$ of N. W $\frac{1}{4}$	15	16	23	80
S $\frac{1}{2}$	3	17	23	320
N $\frac{1}{2}$	9	15	23	320
S. W $\frac{1}{4}$	31	18	26	160

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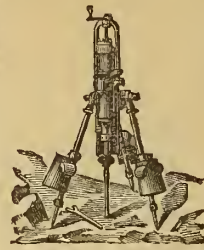
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Lot No. 15, in the 7th Range.
" " 14, " 8th "
W $\frac{1}{2}$ of N $\frac{1}{2}$ " 6, " 11th "
S $\frac{1}{2}$ " 2, " 11th "
S $\frac{1}{2}$ " 12, " 11th "
S $\frac{1}{2}$ " 13, " 11th "
Lot " 1, " 12th "

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In the Township of Portland West,

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50 Square Miles.

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The mining rights on S $\frac{1}{2}$ of Lot
No. 11, in the 8th range of Tem-
pleton. The mineral is of the finest
quality of fibre and in large quan-
tity. Specimens may be seen at
particulars and price ascertained at
the office of the MINING REVIEW.

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**White Marble Quarry on Calumet
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CANADIAN MINING REVIEW

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UNION CHAMBERS, 14 Metcalfe Street.

The CANADIAN MINING REVIEW is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts as well as others interested in Canadian Mineral Lands are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 20th of the month it is to appear.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

DEVELOPMENT OF CANADIAN PHOSPHATE MINES.

It is encouraging to know that the Canadian phosphate deposits are occupying the attention of business men and capitalists outside of the Dominion. The articles bearing upon the subject which have appeared in the last three numbers of the REVIEW have been the means of convincing many, who have heretofore been skeptical as to the feasibility of profitable phosphate mining, that with proper organization and management the industry has become one of more than ordinary importance, and that the majority of the mines

in operation yield, not only a fair rate of interest on the purchase money, but a handsome profit on the working capital employed. That this condition of affairs may continue, a strict observance of careful and business-like management will be required. Economy should be as carefully studied in mining as it would be in any other business enterprise, and everything approaching extravagant organization must be religiously avoided. It is noticeable that, with few exceptions, the properties that have fallen into the hands of business men, with means at their command, have paid handsomely and continue to yield large profits. The successful miners have been those who began cautiously and proved the value of their properties before preparing to carry on permanent operations. To establish the capacity of a phosphate location is an item of no great expense, and, unlike other mineral deposits, but little time is required to prove its value. When it can be shown that a property is capable of a certain specified output, machinery and modern appliances should at once be employed that will mine, handle and deliver the mineral at point of shipment to the best possible advantage. That a great deal of time and much money has been squandered by miners doggedly adhering to the primitive mode of drilling and hoisting, cannot be denied, but the number of steam drills, hoists and tramways now employed at many of the mines is evidence that the error has been realized and the remedy applied. Last year there was but one phosphate mine in the County of Ottawa at which a steam drill was in

use; now there are no less than six, and before the close of the year it is to be hoped that the number may be doubled. The condition of the majority of the mines more than warrants the trifling expense entailed, and the cost of mining would be greatly reduced were the value of steam power more generally appreciated.

THE "HIGH ROCK" MINE.

The reputation of this mine has been so well established that there remains little, if any, doubt that it is one of the most valuable properties in the county. For some years it has been steadily worked, and the annual output shows no signs of diminishing; no mine in Canada has produced anything like the quantity of high grade ore that has been shipped from "High Rock," and the probability is it will rank among the best paying properties so long as phosphate mining continues to be a profitable industry. The mine has been carefully and successfully managed by the company's representative, and much of the present activity in the mining sections of the County of Ottawa is due to its productiveness.

THE "DUGWAY" AND "STAR HILL" MINES

are the property of the Union Phosphate Mining and Land Company, and, though it is only within the last four months that work was begun, both these locations promise to yield a vast amount of high grade apatite. The company displayed good sense in securing the services of Mr. Wm. McIntosh, formerly the manager of "High Rock," under whose able management their property is rapidly increasing in value. The present appearance of the mines must be very encouraging to the owners; every day there is fresh evidence of the vastness of the deposits, and the quantity of ore in sight will measure several thousand

tons. The ore already mined is being forwarded to the railway depot at Buckingham, and within a very short time a tramway from the mine to the company's upper dock on the Aux Lievres River will be completed and will materially facilitate transportation. Captain J. E. Smith, under whose superintendence this work is being carried on, has had wide experience in the construction of trams, and there is every guarantee that the work entrusted to him will be intelligently carried out.

THE "NORTH STAR" MINE

in Portland East, owned by the Dominion Phosphate Company, is a very valuable property, and that the company has a high opinion of its yielding capacity is evidenced by the amount of dead work they are doing preparatory to mining in paying ground. As was stated in the last number of the REVIEW, a open cut has been made to facilitate handling the output from the main body of ore. This was completed by contract, and the company is now engaged in running a cross-cut to further facilitate permanent mining operations. Before going to this expense, the property was carefully tested and the quantity of ore to be moved has been thoroughly established. When the company is prepared to work on the veins, a large quantity of phosphate will be rapidly mined. The quality of the ore is equal, if not superior, to the best that has been shipped from the district, several hundred tons of which have been taken out of smaller leads, converging at the main body, which were crossed in making the cutting referred to.

THE "EMERALD" MINE

continues to yield largely, and the daily output is forwarded to the railway depot at Buckingham. This is no doubt the most conveniently situated mine to the point of shipment, and there appears to be no falling off in the quantity of ore in sight. As

development proceeds, large bodies of mineral of high grade are exposed, and the deposits are sufficiently extensive to warrant the improvements which are in progress on the property.

THE "MCLAURIN" MINE

in Templeton, is among the oldest and most developed mines in Ottawa County, and its owners should be well satisfied with the profits they have derived from working it. The reputation of the ore forwarded from this mine is well established, and analyses of shipments have proved it to be uniformly of a high per centage, so that the shippers invariably realize the highest price for the annual output.

THE "POST" MINE,

also in Templeton, is developing satisfactorily, and continues to increase in value. A quantity of ore has been delivered at East Templeton, and teams are steadily engaged in hauling it from the mine.

OTHER MINES

throughout the county are being vigorously worked. The American Phosphate Company's, the Jackson Rae, the Haldane and the Gemmill Mines, as well as one in Wakefield, under lease to Mr. Isaac Moore, are all yielding well. Recent reports received from the latter property are of a very encouraging nature, about 600 tons of phosphate have already been mined by Mr. Moore, and several new and extensive veins have been opened within the past few weeks, some of them measuring very wide and running for long distances.

Reviewing this summer's work at the mines in the County of Ottawa, the developments prove to be of almost incredible magnitude, which augurs well for the future of the phosphate industry.

Phosphate Quotations.

During the past month there has been a marked depression in the market, and the price of phosphate has declined. It is now quoted in London at 1s. 1d. for 75 per cent., and Montreal buyers are not anxious to purchase. There is every reason, however, to think that this is merely a temporary dullness, and that contracts for next season's delivery will be made at much higher figures. The crops abroad are said to be abundant, and a prosperous season among farmers is invariably followed by increased demand for fertilizers, which has the effect of enhancing the value of the raw material, and so causing a rise in price for Canadian apatite.

COMPARATIVE ANALYSES OF CANADIAN AND EUROPEAN APATITE.

The analyses as given in Table No. 1, were made from samples which were in all cases good sized hand specimens taken from large heaps, such pieces being selected as were most free from foreign mineral admixture, and as a rule the analyses may be said to represent, in a measure, the composition of the mineral of the several localities in its greatest practically attainable state of purity; such, indeed, as might be secured by careful cobbing.

TABLE I.—SHOWING THE COMPOSITION OF CERTAIN CANADIAN FLUOR-APATITES.

	1.	2.	3.	4.	5.	6.	7.	8.
Phosphoric acid*.....	40.373	41.080	39.046	41.139	40.868	40.518	34.032	40.812
Fluorine†.....	3.311	3.474	3.791	3.863	3.731	3.377	2.855	3.554
Chlorine‡.....	0.438	0.260	0.476	0.229	0.428	0.086	0.101	0.040
Carbonic acid§.....	0.026	0.370	0.096	0.223	0.105	0.855	2.848	0.518
Sulphur||.....	.....	.....	.....	.....	.....	.....	3.507	.....
Lime.....	47.828	49.161	46.327	49.335	48.475	49.041	44.198	49.102
Calcium.....	3.732	3.803	4.258	4.195	4.168	3.603	3.062	3.763
Magnesia.....	0.151	0.158	0.548	0.180	0.158	0.205	0.422	0.620
Allumina.....	0.609	0.705	1.190	0.566	0.835	0.267	1.979	0.565
Nickel, cobalt and Copper.....	.....	.....	.....	.....	.....	.....	not det'd.	.....
Iron.....	.....	.....	.....	.....	.....	.....	5.370	.....
Sesquioxide of Iron.....	0.151	0.125	1.290	0.094	0.905	0.083	0.120	0.125
Alkalies—presence not ascertained—.....	?	?	?	?	?	?	?	?
Insoluble residue.....	3.890	0.370	3.490	0.060	1.150	1.630	2.050	0.630
	100.509	99.506	100.512	99.884	100.823	99.665	100.544	99.729
Specific gravity.....	3.1393	3.1493	3.1603	3.1884	3.1641	3.1676	3.2441	3.1750
* Equal to tribasic phosphate of lime.....	88.138	89.682	85.241	89.810	89.219	88.455	74.295	89.098
† Equal to fluoride of calcium.....	6.796	7.131	7.781	7.929	7.658	6.932	5.860	7.295
‡ Equal to chloride of calcium.....	0.685	0.406	0.744	0.358	0.669	0.134	0.158	0.062
§ Equal to carbonate of lime.....	0.059	0.840	0.218	0.507	0.239	1.943	6.473	1.177
|| Equal to Pyrrhotite.....	.....	.....	.....	.....	.....	.....	8.877	.....

1. Township of Storrington.
2. Township of Buckingham.
3. Township of North Burgess.
4. Township of Portland West.

5. Township of Loughborough.
6. Township of Portland East.
7. Township of Buckingham.
8. Township of Templeton.

NOTE.—The specimens from which analysis No. 7 has been determined was fine granular, with occasional imbedded rounded fragments of semi-transparent sea green apatite, which fragments were excluded, the object being to ascertain the composition of the granular matrix. Their presence would have raised the percentage of tribasic phosphate.

TABLE II.—SHOWING THE COMPOSITION OF CERTAIN EUROPEAN FLUOR-APATITES.

	A.	B.	C.	D.	E.	F.	G.	H.
Phosphoric acid ¹	42.229	42.172	42.215	40.120	34.630	34.480	41.990	41.980
Fluorine ²	3.415	3.434	3.746	2.160	3.213	3.450	4.200	4.020
Chlorine ³	0.512	0.566	0.096	0.060	.....	.....	0.010	0.110
Carbonic acid ⁴.....	.....	.....	.....	.....	.....	1.510	.....	.....
Lime.....	49.960	49.894	49.945	50.269	41.150	40.705	49.732	49.898
Calcium.....	3.884	3.934	3.998	2.308	3.487	3.632	4.427	4.294
Magnesia.....	.....	.....	.....	.....	.....	0.160	.....	.....
Allumina.....	.....	.....	.....	.....	.....	1.080	.....	.....
Sesquioxide of iron.....	.....	.....	.....	0.610	3.800 ^b	6.420	.....	.....
Alkalies.....	.....	.....	.....	.....	.....	1.000 ^c	.....	.....
Silica.....	.....	.....	.....	3.100 ^a	12.370	4.830	.....	.....
Water.....	.....	.....	.....	.....	1.250	2.450	.....	.....
	100.000	100.000	100.000	98.627	100.000	99.717	100.379	100.302
1 Equal to tribasic phosphate of lime.....	92.189	92.066	92.160	87.586	75.601	75.273	91.668	91.646
2 Equal to fluoride of calcium.....	7.010	7.049	7.690	4.434	6.800	7.082	8.621	8.252
3 Equal to chloride of calcium.....	0.801	0.885	0.150	0.094	.....	.....	0.016	0.172
4 Equal to carbonate of lime.....	.....	.....	.....	.....	.....	3.432	.....	.....

- A. From Arendal, Norway, by G. Rose.
- B. From Murcia, Spain, by G. Rose.
- C. From Greiner, Tyrol, by G. Rose.
- D. From Estramadura, Spain, by Garzo and Penuelas.

- E. From Estramadura, Spain, by P. Thibault.
- F. From Staffel, Nassau, Germany, by Foster.
- G. From Tokovaia, Ural, Russia, by Pusirevski.
- H. From Sludianka, Russia, by Pusirevski.

a. With alumina.—b. With some alumina, magnesia, iodine (traces) and carbonic acid (by difference).
—c. Consisting of potash 0.58 and soda 0.42.

Manufacturing Super-Phosphate.

This is an industry that would appear to be within easy reach of enterprising Canadians, and in fact the feasibility of erecting factories for the purpose, convenient to the apatite deposits, is occupying the attention of some of our go-ahead neighbours across the frontier. When it is taken into consideration that thousands of tons of our Canadian apatite are forwarded annually to England and manufactured there and shipped in the form of super-phosphate to Baltimore and other American ports for consumption throughout the United States, it is but reasonable to reflect upon the advisability of utilizing the many natural facilities we have in Canada for manufacturing the product of our apatite deposits. The raw material for the production of sulphuric acid is in abundance; water-power and fuel are everywhere to be found, and cheap labour is procurable. All these are important considerations, and the question of home manufacture of super-phosphate should be carefully looked into. The industry has paid enormously elsewhere, under less favourable circumstances. Why should it fail in Canada?

AN ATTEMPT TO SWINDLE

In almost every mining district there are to be found men who are unprincipled enough to resort to anything that will aid them in perpetrating fraud. Until within a short time, however, the property owners in the County of Ottawa have enjoyed the reputation of being singularly honest in negotiating the sale of their mineral lands, but, alas, a clumsy attempt to *salt* a property in the Gatineau Valley has recently been discovered. The owners, whose names are known to us, are brothers, who, for some time, have been giving their attention to salting their farm with phosphate, and had succeeded in transplanting several hundredweight of the mineral before their fraudulent occupation was detected. When we are in possession of further information on this matter, the names and locality will be published, and in future, any attempts at deception of this nature will speedily be exposed when brought before our notice.

HAYCOCK IRON MINE.

Notwithstanding that very encouraging reports have reached Ottawa during the past few months, relative to the negotiations in England for the sale of the Haycock Iron Mine, it is to be regretted that the matter should not, ere this, have taken more definite shape. A sale can hardly be said to have been concluded until money has changed hands, and we have not yet heard of the English capitalists having

paid over any sum that would effectually bind them to close the bargain. From articles on the subject, which have appeared in the London journals, it is natural to suppose that the gentlemen who are to represent the new company have more than satisfied themselves of the value of the property they have been bidding for. Nothing could be more flattering than Mr. Howson's report, the English expert who was sent out expressly to examine the mine, etc., and, coinciding as he does in every particular with the views formerly expressed by Professor Chapman and others as to the richness of the property, it would appear needless to look for further justification before concluding the purchase, and yet negotiations will remain *in statu quo* pending the arrival of one more visitor from England who has been dispatched for the purpose of re-examining and reporting. It is to be hoped that, at this stage of the negotiations, no unexpected hitch may arise to upset anything that has been already accomplished. That the Haycock Mine is one of great value is an established fact, and that it should have remained idle for so long is much to be regretted, consequently any arrangements with English capitalists that will bring about the resumption of active operations will be satisfactory to those who are interested in the company's welfare and to the Ottawa people in general.

GOLD AND SILVER

In the County of Ottawa.

For some years back repeated rumours have been afloat to the effect that gold and silver-bearing quartz had been discovered in the Township of Wakefield. But a few days ago a local journal gave Mr. Vennor credit for having discovered gold and silver in paying quantities in quartz in the third Range of the above named township. That gold and silver-bearing quartz has been found in the locality there is no reason to doubt, but that it occurs in paying quantity will remain a subject for speculation. Careful examination of the location and the quartz referred to, has convinced scientific men that the precious metals are not to be found there in paying quantities.

ASBESTOS.

The mining rights on the asbestos property, known as Lot No. 11, in the 8th Range of the Township of Templeton, passed into new hands during the month, and the present owners, who are engaged in the manufacture of asbestos goods in New York, are making preparations to begin mining operations. This property, though a good one, has been allowed to remain idle up to the present, and there is every indication that it will develop into one of great value. When work begins

on this property it will be the initiation of asbestos mining in the district, and will doubtless be the means of attracting attention to other deposits, and inaugurating another industry in the Ottawa Valley.

Asbestos mining in the eastern townships actively continues and the mines are yielding freely. The quality of mineral is of high grade as to texture, and the fibre varies in length from one to four, and, in some cases, six inches. In Thetford, Broughton, and Colrairie townships, and at Danville and Wolfstown, the quantity being mined is very great, and the capacity of the mines is being thoroughly tested. It is a question in the minds of many who have visited the localities if the properties are being worked to the best advantage as regards economy, and it is quite possible that some improved system might be devised that would yield a larger profit to the owners.

MINERAL RESOURCES

vs.

SCIENTIFIC MINING.

The following article has appeared in the *Chicago Mining Review* and will bear republishing, as it applies as forcibly, if not more so, to the miners of Canada, as to those of any other section of the globe.

"The many improvements made in mining machinery, and numerous new appliances which are constantly coming to light, tend, in a measure, to show that a great need is becoming recognized, and the inventive minds of the age are running in a direction where much is yet required.

"Mining is practically a new industry to many of our people, and it is evident that the rapid growth of this business and its establishment in widely different fields has been far in advance of the methods and appliances required to secure the best results. That the problem will be successfully solved no one, who comprehends the magnitude of the immense resources to be developed and the important advancement of this great industry, can for a moment question. The mineral field is wide, its character diversified, and its requirements have not been fully met, as the two great factors of cost and loss too plainly testify; but we are making rapid strides in the direction of improvement, and better results indicate the progress made.

"It is very plain to the student of the economic plan of nature that everything created has, somewhere and at some time in the history of development, a place and use; hence it is evident that there is in mineralogy and metallurgy much to be learned, and it is certain that many things, now destroyed as useless, have a value, and should be more carefully investigated and studied by worker and scientist.

"There cannot be too many improvements or new inventions; all must be tried by the test of practical experience and success made from the study of repeated failures. The knowledge gained by the many experiments, in widely diversified fields, must be crystalized into the lines of an exact science, and progress built up from increasing knowledge."

MINING NOTES.

Nova Scotia.

Everything about the mine and mill of the Oxford Gold Mining Company is in a satisfactory condition. The late scarcity of miners, during the fishing season, somewhat retarded operations, but they are now more plentiful, and opening work on the different leads will be proceeded with thoroughly and vigorously. The face of the east bluff is 25 feet high, and enough ore is in sight for three months' work. Work continues on the lake lead, and on the mill lead the main shaft will be sunk by contract as soon as tenders will have been received by the company. The ore in this lead continues of the same high grade that has characterized it heretofore. The milling plant on the property is very complete and is pronounced the best in the province, and equal to any that is in use elsewhere. The assay of tailings at the mine made from time to time shows hardly more than a trace, and the *N. Y. Engineering and Mining Journal* refers to a lot that was tested in New York and gave only 88 cents per ton, which, from perfectly "free" ore, is, to say the least, not a little remarkable when it is milling over \$60 per ton.

This company has declared its regular monthly dividend (No. 6) of 5 per cent., payable August 25th.

Manganese deposits of a very superior quality have been discovered and tested by Mr. R. J. Stephens, near Walton, Hants County, Nova Scotia. It lies in the same formation as the ore of the Tenecape Mine, and is distant from it about eight miles. In Hants County, an irregular annual export of manganese has been maintained, amounting, since 1861, to about 2,000 tons, valued at \$110,000. Formerly extensive operations were carried on at Tenecape, Walton and Pembroke, but are now confined to the first-mentioned locality. The Hants County ores are of a very high grade, yielding 90 per cent. and upwards of peroxide, and, being almost free from traces of iron, are valued by the flint glass maker, as glass is apt to contract a greenish tinge from the presence of iron. It is also used for black enamel for pottery, tiles, etc.; in calico printing, and in many other industrial appliances. The manganese yielding district in Hants County, which gives promising indications, is over

150 square miles in extent, and the absence of workings may be traced, not to a deficiency of the ore, but to a want of enterprise and capital.

The agents of a powerful syndicate of Boston and New York capitalists have been, during the past few weeks, visiting and inspecting a number of gold locations in the Province of Nova Scotia. The result is they have purchased a mine at Mount Uniacke, one at Chezetcook, and, it is rumoured, several others. The proprietors will work their newly acquired properties extensively and vigorously.—*New Era, Halifax.*

The Renfrew Consolidated Gold Mining Co. have for some time been carrying on operations at a heavy loss in the hope of striking paying quartz at a lower level. After sinking upwards of 100 feet through barren rock, the miners have come on a body of ore, three feet in width, carrying a large percentage of gold, and the prospects are that the company will be rewarded for their pluck and labour.

Operations are said to be proceeding with most efficient regularity and system at the Coxheath Copper Mines, near Sydney, Cape Breton, and, though a new enterprise, the results are already exceedingly gratifying and are apparently certain to become more so in the immediate future. These mines are owned by Boston capitalists.

A bar of gold weighing 126 ounces, the product of 42 tons of quartz from the Lake Catcha district, was recently shipped from East Chezetcook in Nova Scotia. This shows a yield of three ounces of gold to the ton of quartz, and the mine is reported to be growing richer as the work progresses.

Ontario.

It is reported from Silver Islet that another rich pocket of ore has been met with in the 1,600 ft. level. Such pockets of silver have been phenomenal in this mine and have invariably been very productive. This latest intelligence has had the effect of increasing the value of the stock, principally held in Boston, from four to eight dollars per share. Silver Islet stock on the 16th July was sold at \$3, on the 18th, it had risen to \$7.50, on the 23rd, it had declined to \$6.50, on August 1st, the stock had fallen to \$5, on 9th inst., it reached \$4, at which price it is now quoted. The sudden rise from \$3 to \$7.50 in two days was caused at the time by the rumour above reported. That the stock should have since declined to \$4 is substantial evidence that the rumour had been somewhat exaggerated.

Professor Selwyn, who has been for some time in the mining district of Western Ontario, left Thun-

der Bay about the middle of the month, accompanied by Mr. T. A. Keefer, for the Rabbit Mountain Silver Mine. As this mine has been spoken of as one of the richest discoveries in America, Professor Selwyn's report will be looked for with much interest, as it was his intention to spend some time in carefully examining the location.

At the "Large Wollaston Mine" in the County of Hastings, a large force of miners are employed, and there is now about 25,000 tons of magnetic iron ore mined and ready for shipment. The ore yields a high percentage of metal, and is free from objectionable features. As soon as the means of transportation are completed, this output will be forwarded to smelting works in the United States.

At the "Glendower Iron Mine," in Bedford, County of Frontenac, about 3,000 tons of ore await shipment, and mining is being vigorously pushed. The ore is magnetite of a very fine quality, and the mine is turning out very well. The shaft is down 50 feet, and the body has been open 25 feet from the hanging wall without the foot wall having been reached.

A very handsome specimen of native gold in quartz has been received from the County of North Hastings. It was taken from a newly discovered lead said to be 9 feet in width and traceable for a considerable distance. The specimen referred to carries at the rate of several ounces of gold to the ton.

Manitoba.

If all that is written about the gold mines in the Lake of the Woods District is reliable, then indeed we may look for developments that will, in point of richness, equal anything that has been experienced in California or Australia; but it is to be feared that in too many instances the hope is father to the thought, and that those who are directly interested in the success of the mines in that section allow themselves to be carried away by the excitement of the moment, and are apt to exaggerate facts in some degree. That this part of the province is destined to become an important gold and silver producing section there can be little doubt, but it is dangerous to expect too much at the outset, or to misrepresent the value of the mines or the yielding capacity of the ore. Those companies that have been engaged in active mining have every reason to feel satisfied with results so far, and success will surely crown their efforts if they will but exercise ordinary patience and conduct their operations economically and with proper care and intelligence.

The *Rat Portage Progress* publishes the following:

RAT PORTAGE DISTRICT.—Pros-

pects are very cheering for mining industry to become permanent and develop to large proportions. Numbers of experts, mining engineers and representatives of syndicates and capitalists who have been visiting here of late, could but have a good effect when it is considered that, without a single exception, they have expressed themselves thoroughly satisfied with the prospects. Already English and American companies are bidding high for two or three partially developed properties on the lake, and it is to be hoped owners will not stand in their own light by placing their figures beyond reason. Even one company with a large capital, and the proper men to operate the mine, would establish the mining industry on a sure and solid basis.

PINE PORTAGE.—The ore on this property is turning out beyond the most sanguine expectations. Every shot shows an improvement in the vein. Both the foot and hanging walls glitter with the precious metal, and the old and tried miners become excited as they view it. The richness of this mine is regarded as fabulous. Several offers have been made for its purchase but all to no use.

In the Lake Winnipeg region some extensive bodies of Hematite and Bog iron ore have been met with, the former assaying 54 and the latter 44 per cent. of metal. The deposits are said to be conveniently situated for transportation of ore, of which immense bodies are reported in sight.

WINNIPEG CONSOLIDATED.—The new machinery lately put in the mill is working without any interruption. The amalgamating and grinding process is going on night and day, and a large gold brick at no distant day will gladden the hearts of the promoters.

British Columbia.

Most favourable reports come from the mining centres of the province, and capital is being brought in to improve the mines and to give an impetus to the industry generally. The Cariboo district is particularly promising and is again attracting much attention, and the miners are said to be somewhat excited over the prospects. The *Victoria British Colonist* publishes the following letter written by a gentleman who has recently visited the district:

CACHE CREEK, July 30.

I have sent some quartz specimens to Mr. F. S. Barnard, taken from the Enterprise tunnel, lately located by J. Perkins, as the previous record had lapsed. Fifteen hundred feet is the extent of the ledge, and the tunnel has been run in four hundred feet. Men are now working a shaft about thirty feet ahead of the tunnel, from which

came the specimens I have forwarded; also sent down the gold which fell from the quartz as I was breaking it. I left Bakerville eight days ago. Mr. Mouatt told me that twice the amount of gold had passed through the assay office this year as compared with last. Several claims are paying well. The Chinamen also on Antler Creek are in excellent spirits. I am certain that if the prospects that are on Burns Mountain were in Mexico or Arizona they would be thought very good and be worked with a will. A company with \$10,000 capital has been formed to prospect Slue Creek, and propose to pay, if required, 10 per cent. per month. They will probably have a boring machine to enable the true channel to be found.

W. P. TROUNCE.

United States.

The Calumet and Hecla Copper Mining Company have declared their regular quarterly dividend, payable this month, of five dollars a share, aggregating \$500,000, and making the total of dividends for this year, to date, \$1,500,000.

THE RICHMOND CONSOLIDATED MINING COMPANY paid a quarterly dividend of \$1.25 a share at their London Bank on the 10th instant, aggregating \$67,500. Total of dividends to that date, \$3,974,887.

THE HOMESTAKE MINING COMPANY have declared their usual quarterly dividend, payable this month, aggregating \$50,000, and making \$400,000 paid since 1st January.

CORRECTION.

It was stated in the July number of the REVIEW that mining operations had been suspended by the Roberts Iron Company, of Roberts-ville, Frontenac County, owing to the falling off in the demand for ore. The Company's superintendent corrects this statement by letter and reports that there has been but a temporary reduction in the operative force at the mines. We are pleased to know that our information was not authentic, and lose no time in correcting the mis-statement.

Answers to Correspondents.

Editor CANADIAN MINING REVIEW
Ottawa.

Dear Sir,—Will you be good enough to give me some information concerning the "Canada Consolidated Gold Mining Company," whose property is situated in the vicinity of Belleville, Ontario? I wish to ascertain in what shape the Company's property is at present, what work has been done, the amount of money that has been spent, and, in short, I will be obliged for any in-

formation you may be able to extend to me through the columns of the REVIEW or otherwise.

W. A. P.

THE CANADA CONSOLIDATED GOLD MINING COMPANY was organized under the laws of the State of New York in 1880 with a capital of \$500,000, in shares of \$1.00 par value; of this, \$75,000 was set aside for working capital, and the balance duly allotted to subscribers in Montreal, Quebec and New York, and subsequently a number of shares found their way into the hands of some gentlemen in France. The Company's property is situated in Marmora Township, County of Hastings, and consists of about 800 acres of land on which there are veins of gold-bearing quartz about 3,000 feet in length, covering a width of some 20 feet. At the close of 1881 three shafts had been sunk a depth of 180, 70, and 50 feet respectively, and three to a depth of 40 feet each. From the 180 foot shaft, four levels had been driven, aggregating 250 feet. This work has all been done on the veins, and about 8,000 tons of ore raised, of which 1,000 tons were unskilfully reduced and \$2,100 realized therefrom. The property is well equipped with mining machinery, Blake crushers, jigs, etc., and the plant is approximately valued at \$20,000. Besides some dwellings that have been erected, there is a boiler and engine house 40 x 20 feet, and a furnace house 220 x 60 feet, supplied with 17 arsenic chambers, all of which are now quite full of arsenic.

Mining operations were vigorously pushed during the first year, and at the close of 1881 they ceased, the company having expended the \$75,000 set aside for working capital. First mortgage bonds were then issued for \$100,000, and during 1882, and until a few months ago, attention was given exclusively to experimenting with the ore and devising and erecting machinery for the purpose. The \$100,000, the proceeds of the first mortgage bonds, was in this way exhausted, together with an additional \$50,000, or thereabouts, to which amount the company found itself in debt. The company, as may be seen, has spent \$225,000 since its inauguration, and has 7,000 tons of ore ready for crushing, having realized \$2,100 in gold from 1,000 tons of ore, with additional assets in the shape of buildings and machinery. During the past few months no work has been done on the property, but it has recently been leased to a party of gentlemen, members of the company, on the following conditions: lessees have agreed to expend \$150,000 in erecting suitable mills and machinery for treating the ore, and in other ways to improve the property. For this they take second mortgage bonds on the property for \$300,000, and apply the profits to reimbursing themselves.

When the \$150,000 will have been paid off in this way, the second mortgage will be discharged, and the lessees will receive \$300,000 in fully paid up stock. It is to be presumed that it will be necessary to increase the capital stock that amount (\$300,000), the original \$500,000 having been all allotted. The property is said to be valuable, but it has been found difficult to treat the ore advantageously. A large amount of money has been spent in finding this out and discovering the means of overcoming the difficulties, of which the present lessees will have the full benefit. The ore, which is mispickel, will be treated by the chlorination process, and elaborate preparations are now being made to proceed with the reduction of the ore scientifically and on a large scale, and it is to be hoped that this venture may be attended with more profitable results, and that the lessees may realize their anticipations.—[Ed.]

Editor CANADIAN MINING REVIEW.

Dear Sir,—I have a quantity of second quality of phosphate at my mine in Templeton, and would like to dispose of it. Can you tell me what is its probable value, and where I could find the most profitable market?

A. S.

There has been a large quantity shipped to Chicago and other Western cities, the majority of which was forwarded by Mr. Lomer, of Montreal, a phosphate buyer. There certainly is a market for second quality, but, having no idea of the percentage of your lot, it would be difficult to quote a price.—[Ed.]

THE MONTREAL G. AND S. MINING COMPANY.

As queries are made of us regarding the value of the stock of this company, we should be obliged to the CANADIAN MINING REVIEW for the information whether such organization actually exists, and if so, the locality of their property, as well as its industrial condition at the present writing.—*Mining Record, N. Y.*

Inquiries have been made in the mining centres of Canada, as well as at the Provincial and Dominion Registry Departments, but up to the present moment no information has been obtained to prove the existence of the above-named corporation. It is quite possible, however, that such a company may have been organized under a State law of the United States.—[Ed.]

Navigation of the Aux Lievres River.

Complaints are made by the residents of Buckingham and the country north of it, that no steps have been taken towards making the much needed improvement at the Little Rapids, for which an appropriation was made by Parlia-

ment last session. The traffic on the Aux Lievres has assumed such dimensions that the improvement of the navigation of the river has become a matter of public importance. It is contended that a dam which would raise the water at the Little Rapids six feet above its present level would obliterate the Long Rapids and give uninterrupted navigation from Buckingham to the High Falls, and that this could be done without flooding more than twenty acres of land. Captain Cooke is running a small steamer above the High Falls to the Pines, a distance of 18 miles. The delightful scenery of the Lievres is attracting the attention of pleasure seekers. Every steamer leaving Buckingham on the upward trip has been crowded with tourists, many of whom have availed themselves of the accommodation furnished by Captain Cooke to visit the romantic country north of the far-famed Chute. Numerous camping parties have sought the shady retreats of the Laurentian Hills, and fished in the "endless, endless lakes" during the holiday season. When the Ottawa Colonization Railway is constructed, the northern country will attract more tourists than even the Thousand Isles or the Rideau lakes—certainly more sportsmen and fishermen, to whom it is a paradise from which they have long been excluded by the formidable chain of hills and pathless forests extending north of the city.—*Daily Citizen.*

If these improvements can be accomplished it would greatly facilitate the transportation of phosphate during the summer season from mines up the river, and would increase the value of mineral land that now lies too far distant from water or railway communication to render ore transportable.

RAILWAY NOTES.

Ottawa and Gatineau Valley Railway.

The contractors for the construction of this railway are providing themselves with plant and organizing in a manner that will ensure the rapid prosecution of the work they have undertaken. Owing to the scarcity of men, at the time the contract was signed, but a small force had been employed to within a few days ago, when a force of Italian labourers, numbering about sixty, were imported from New York State and engaged on the works. Mr. Macdonald, the senior member of the firm of Macdonald, Bray & Co., contractors, arrived in Ottawa during the latter part of the month, and has been busily engaged in perfecting a permanent organization that will enable the firm to proceed with construction systematically and with despatch. Some grading has already been done, and before winter sets in there is every prospect that several miles of the line will be ready to

receive the rails. Energy and activity have characterized the efforts of the promoters of this enterprise, and it is to be hoped that the contractors will prove themselves as capable of completing the undertaking as have been the promoters in inaugurating it.

It would be natural that the company should look for co-operation and substantial assistance from the property owners along the line rather than antagonism and unreasonable exaction. This railway, when completed, cannot fail to be a boon to the residents of that part of the country through which it will run, and will have the effect of enhancing the value of property. This should be seriously taken into consideration, and should influence owners of property in their negotiations with the company for the right of way; but such has not been the case, and at the outset the very men, influential in the county, who had pledged themselves to promote the interests of the railway, were the very ones to inaugurate a system of extortion which, as might have been expected, is being adopted by their equally grasping neighbours, and the prices asked for land, useless for agricultural purposes, and valueless in other respects without the railway, are outrageous. Such want of public spirit was not to be anticipated, and it is to be regretted that the company should now find themselves hampered by those who had heretofore professed themselves staunch supporters of the project.

That the road, when constructed, will lend an impetus to the mining industry in the County of Ottawa is made apparent by the fact that prospectors are already busy exploring that section of country lying many miles north of the district in which mining has heretofore been carried on, and repeated reports have come in of newly discovered mineral deposits which have been neglected on account of their inaccessibility and the impossibility of transportation in the absence of railway communication. The Ottawa and Gatineau Valley Railway will doubtless be the means of developing the natural wealth of the country it is to traverse.

Sherbrooke and Magog Railway.

This road, when completed, will furnish an important auxiliary to our mining industries, which should not be overlooked in estimating the advantages it will confer on those sections of the eastern townships it is proposed to traverse. It is the intention to construct a branch line to the mining properties already developed, known as the Suffield Copper and Silver Mines, and the Hepburn Copper and Sulphur Mine, which branch will also run close by Mr. Clark's rich iron mountain. The ore from these mines can thus be taken by rail to the smelting-works on the main line, or find a direct outlet to New York down the Hudson River Valley.

The Kootenay Railway.

As was foreshadowed in the July number of the *REVIEW*, Sir Alexander Campbell's visit to British Columbia has virtually settled the vexed question of disallowance. After receiving a deputation at Victoria, from the Board of Trade, who are in favour of the bill, and also a body of gentlemen who are opposed to the granting of the charter and land subsidy, the Minister of Justice dealt with the subject liberally and practically. He suggested that an amendment to the bill, making it obligatory on the company to use the C.P.R. line in the transportation of the products of the Kootenay mines, might be passed at the next session of the Local Legislature; also that they would not be allowed to go nearer than twenty miles of the boundary in the shipment of their ores. These suggestions had previously been made by him to the promoters, whom he had met in San Francisco, and as they had expressed themselves quite willing to submit to the proposed amendments, Sir Alexander thought the company might proceed with their expenditures with the certainty of the bill being allowed. As the construction of this railway will open up a section of country abounding in mineral wealth, but heretofore inaccessible, and will circulate a large amount of foreign capital in the province, the promoters should receive every assistance and encouragement that would in any manner precipitate the successful completion of their undertaking.

A Miniature Locomotive.

The *Engineering and Mining Journal*, of New York, quotes from the *Railway World* that the smallest locomotive engine ever built in the United States for regular work was recently turned out by M. M. Buck & Co., of St. Louis, and shipped to the Edmee plantation, St. Charles Parish, La. This little engine was designed by and built under the supervision of Mr. Jay Noble, and is as perfect a piece of mechanism as one would wish to see. Its diminutiveness may be understood from the following facts respecting it: twenty-one and one half inch gauge; diameter of cylinder, $6\frac{1}{4}$ inches; stroke, 10 inches; four wheels, diameter of driving wheels, 24 inches; height of engine to top of boiler, 4 feet 7 inches; weight, without water, 5,250 pounds. The engine has link motion, and is made of the best materials throughout. The boiler is of $\frac{1}{2}$ inch iron, and is 30 inches in diameter in the barrel. It is provided with an Orm patent pop-valve, has a steel fire-box and is fed by two inspirators. The tank is made of No. 10 iron, has four wheels of a diameter of 16 inches, a capacity of 380 gallons, and weighs, without water, 1,400 pounds. In experimenting with the engine before it was shipped, it was found to act very obediently

under the hand of the engineer. A locomotive such as the one described should be well adapted for tramways at mines where ore is carried any distance to point of shipment. Miners desirous of obtaining particulars as to price and capacity can do so by applying to the publishers of the *CANADIAN MINING REVIEW*.

GEOLOGICAL MUSEUM OF CANADA

During the past three months the field geologists attached to the Geological Survey, one of the most important branches of the Government service, have been steadily engaged in exploring and examining the mineral sections of the Dominion and in noting the progress made in the mining districts where active operations are being proceeded with. A large and most interesting variety of specimens have been forwarded by them to the museum at Ottawa, and will shortly be exhibited for public inspection. In addition to the specimens of economic minerals, there are many that have no commercial value, but are wonderfully interesting to the student of geology, some of which are very beautiful and valuable as curiosities. The museum continues to attract a large number of visitors and, as the official book shows, there have been no less than 3,158 names registered from June 1st, up to August 24th inclusive, being an important increase on the number registered during the same period of last year.

ADMINISTRATION OF MINING ENTERPRISES.

One of the chief causes of financial mishap to so much of the money invested in mining enterprises in this country, is in the manner that the business side of the adventure is carried on.

Men associating themselves together to employ their money in the enterprise of manufacturing hats or shoes, cotton or woollen fabrics, or even to build or operate a line of railway, are sure to be at much pains to place the immediate supervision of the industrial conduct of their business in the hands of men practically acquainted with all the details, say, of making hats or shoes, or, in case it were a railway to be laid out or built, the work of planning and overseeing would be entrusted to practical and experienced engineers, men thoroughly acquainted with such undertakings. It is hardly in this rational manner that mining in Canada has been conducted by associated capital, and, as a consequence, many wrecks have resulted in an industry which intrinsically affords a most fertile field for investments if properly cultivated by men having a practical knowledge of their business.

A board of directors composed of merchants or bankers, aided by a

clever solicitor, cannot safely or intelligently dictate from their city offices the underground workings of a silver, gold or copper mine, or how such a property should be exploited. Capitalists should engage in mining in the same intelligent, practical and business-like way that they do in railway construction or manufacturing, and they would learn that there are few enterprises more likely to yield good returns on the money invested. The pith of the foregoing is taken from an article which has appeared in the *N. Y. Mining Record*, addressed to capitalists in the United States who invest their means in mining ventures and give no attention to the manner in which their money is employed. If nature has, in some instances, so provided that failure is impossible, all is well, but, on the other hand, should success not crown their efforts to make the mine profitable, the shareholders and directors condemn the property and attribute their failure to a deficiency in the quantity or quality of its ore. From end to end of the Dominion there are monuments to wasted capital in abandoned mines where, if proper management had been observed and skilled and competent labour employed, together with scientific knowledge and suitable machinery, there is abundant mineral wealth to pay large profits on the capital necessary to their proper development. Hardly a day passes but some such property, that has long since been abandoned, falls into the hands of English or American companies, and in many instances, under careful and practical management, they are found to yield profitably. The majority of Canadian people are too conservative to invest in mining enterprises, many have not the means, and those who have, if they are not disposed to risk sufficient to thoroughly organize and equip their mines, with a view to carrying on operations to the best advantage, will do well not to engage in such undertakings.

MORE OF CONNECTICUT'S TRACK MARKED SLABS.

Some remarkable specimens of the tracks of fossil beasts and birds have been discovered recently in the Portland, Conn., quarries. The tracks were taken from a stratum about six or seven inches thick, lying at a depth of about eighty feet from the top of the quarry. One track measures fifteen inches by eleven, and is larger than the track of any living elephant, shows the impression of the toes very distinctly and unmistakably, and also the reverse representation of the impressions of the inner muscular projections of the bottom of the huge foot. Of tracks there are three on a single slab five to six feet long and perhaps a yard or more wide and seven inches thick. There is no mistaking these tracks. They

are evidently the tracks of some huge beast—and one of the elephant kind, too—and not any mere accidental formation by other cause. On one slab near the creature's tracks is a stony heap of his ordure, known in geology as coprolites.

One slab bears the unmistakable tracks of some three-toed bird, seemingly of the ostrich family. These tracks are remarkable for being almost perfectly in a straight line, as if the creature had but one leg; no Indian could step straighter. The stride is about a foot and a half. However it may be with some other supposed "fossil bird track" in the Connecticut valley sandstones, these certainly are no tracks of the labyrinthon or any other ancient frog; they are bird tracks.

One slab bears the impress in relief of the longitudinal half of a tree trunk, seemingly, according to most observers, a hickory tree—for its shaggy bark and its very texture are wonderfully preserved. The slab was ten feet long, and bore the cast of the tree all the way, but this specimen is but three feet long—the part of it having been cut off at the quarry.—*Granite Cutters' Journal*.

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Frequent enquiries are made at this office for men who understand running Steam Drills, for Mining Captains and Practical Miners. Such men who are out of employment may find it to their advantage to forward name and address, mentioning the class of work they are qualified for, etc., to the CANADIAN MINING REVIEW, Union Chambers, 14 Metcalfe Street, Ottawa.

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**NOTICE TO CONTRACTORS**

SEALED TENDERS addressed to the undersigned, and endorsed "Tender for Departmental Building, Ottawa," will be received at this office until WEDNESDAY, the 12th day of September next, inclusive, for the erection of a

DEPARTMENTAL BUILDING,

AT

OTTAWA, ONT.

Plans and specifications can be seen at the Department of Public Works, Ottawa, on and after MONDAY, the 20th instant.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque, made payable to the order of the Honourable the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party declines to enter into a contract when called on to do so, or if he fails to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

By order,

F. H. ENNIS,

Secretary.

Department of Public Works,
 Ottawa, 14th Aug., 1883.



DEPARTMENT OF PUBLIC WORKS.

AUCTION SALE.

Public Notice is given that under instructions from the Honourable the Minister of Public Works, there will be offered for sale by Public Auction—A. B. Macdonald, Auctioneer—at the Pump House, at the foot of the Rideau Canal, Ottawa, at 2 o'clock p.m. sharp, on Saturday, the 1st September next, the Machinery which supplied the Parliament and Departmental Buildings with water previous to the completion of the Ottawa Water Works, and which would be capable of efficiently supplying any small town, mill or manufactory.

This Machinery to be sold consists as follows:—

A Horizontal High Pressure Engine 14 inches diameter and cylinder, and 30 inches stroke, two double acting pumps, each 6 inches diameter by 24 inches stroke.

The machinery will be sold in one lot as it stands now in Pump House, at the foot of Rideau Canal, in the city of Ottawa. The whole to be removed by the purchaser at his own cost, within 14 days from date of sale.

The terms will be 25 per cent. of the purchase money to be paid on day of sale, and the balance within four days thereafter.

The machinery can be seen at any time, and a detailed catalogue of the various machinery has been prepared, and will be had on application to A. B. Macdonald's office, or at this Department, on and after the 9th instant.

By order,

F. H. ENNIS,

Secretary.

Department of Public Works,
 Ottawa, 7th August, 1883.

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W $\frac{1}{2}$ and N. E $\frac{1}{4}$	35	14	23	480
N $\frac{1}{2}$ and S. E $\frac{1}{4}$	19	15	23	480
S $\frac{1}{2}$ and N. E $\frac{1}{4}$	15	16	23	480
E $\frac{1}{2}$ of N. W $\frac{1}{4}$	15	16	23	80
S $\frac{1}{2}$	3	17	23	320
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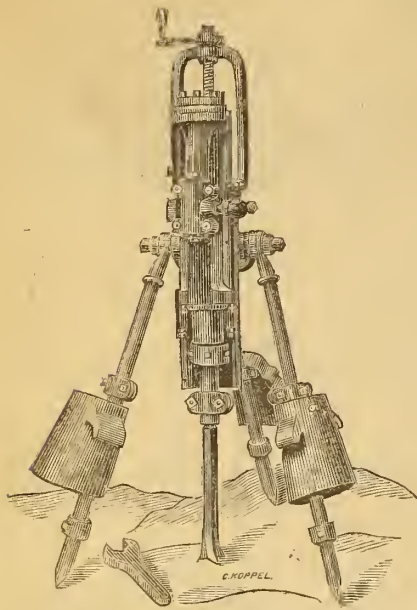
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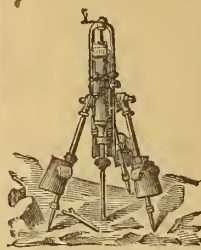
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CANADIAN MINING REVIEW

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UNION CHAMBERS, 14 Metcalfe Street.

The CANADIAN MINING REVIEW is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts as well as others interested in Canadian Mineral Lands are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 20th of the month it is to appear.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

CANADA'S 'PHOSPHATE INDUSTRY.'

Reports received during the month from the phosphate mines in the County of Ottawa are of a very satisfactory nature, and the output continues to be appreciably in excess of any previous year. The temporary dullness of the market has in no way affected the conviction of miners that prices will improve by the time manufacturers abroad are prepared to make contracts for next season's shipment; this is evidenced by the activity prevailing at the mines and the determination of owners to increase their facilities for

raising ore. There has been no noticeable falling off in the number of men employed, except in isolated cases and under extenuating circumstances. Several new mines have been opened during the past month, but, as yet, there has not been sufficient work done to warrant any detailed account of prospects or even a description of the properties. Some of them have, however, paid from the surface, and continue to improve. The weather has been everything that could be desired for the profitable prosecution of work, and it has been fairly taken advantage of.

The analyses of shipments to England during the summer show that the output sent forward was of a higher standard than that of any former season, which goes to prove that miners have begun to appreciate the importance of shipping their mineral in as high a state of purity as can be arrived at by hand manipulation. The extra labour employed in careful cobbing is insignificant compared with the advantage to be gained by raising the analysis of a shipment two or three units; not only is there immediate benefit derived, but it has a tendency to facilitate negotiations for future sales.

A party of English gentlemen, more or less interested in mining matters at home, visited some of the phosphate mines in this neighbourhood, and in the vicinity of Perth, and expressed themselves much interested in the industry. No doubt we will hear from them again, as they were very careful in collecting statistics and all information and data that would enable them

to speak intelligently on the subject when they returned to England. These gentlemen had no idea that phosphate mining in Canada had assumed such proportions, which is fresh evidence that this important Canadian industry is known abroad but to the few. There is capital in England awaiting investment that will be sent to Canada for the development of any legitimate enterprise, and it is the duty of everybody, directly or indirectly interested in our phosphate industry, to do all in their power to establish it on a sound and permanent basis. Lack of capital to develop the natural wealth of Canada has been the cry for years. Let Canadians prove themselves worthy the confidence of capitalists outside of the Dominion, and the requisite means will be forthcoming.

THE MINES.

Owners of mines express themselves satisfied with the result of the month's work, many of whom are forwarding their output regularly to the Canadian Pacific Railway Stations, while others, not so conveniently situated, are allowing theirs to accumulate, awaiting winter transportation.

THE "HIGH ROCK" MINE

continues very productive and the openings are developing with that regularity which has already established the character of the mine. About 15 tons are being raised daily, and the ore is of a high grade. This property has much increased in value in the hands of its present owners, whose manager, Mr. A. McIntosh, appears to understand his business and to watch the interest of his employers beyond the ocean.

THE "DUGWAY" AND "STAR HILL" MINES

owned by the Union Phosphate Mining & Land Company, though more recently opened, are keeping pace with "High Rock" and their daily output is much the same. The ore raised on this Company's property is very pure, and a quantity has already been delivered at Buckingham station—it appears to have been carefully picked over and has been forwarded in a clean state. The many openings which have been made on the location are developing most satisfactorily, and are confined to but a small portion of the Company's territory. Money has not been spared in equipping the mine with appliances most suitable to this class of mining, and everything connected with it is of a substantial character.

THE "NORTH STAR" MINE,

formerly worked by a firm of contractors, is now being developed by its owners, the Dominion Phosphate Company, with encouraging prospects. The mineral at this mine is the purest that has been raised from any part of the County, free from admixture with impurities, with which Canadian apatite is so frequently associated, and which adds to the cost of cleaning up. Mining operations are being conducted by Mr. W. H. Smith, a practical and shrewd superintendent, and the general management of the work is carefully attended to by Mr. Huntton, Managing Director of the Company. The amount of phosphate being raised is limited, as the force is employed, exclusively, in making a second open cut before attacking the body of ore, but, in doing this, a considerable quantity of phosphate has been met with, the value of which will reduce the cost of dead work to a minimum.

THE "EMERALD" MINE,

now the property of Mr. W. A. Allan, of Ottawa, is, without doubt, the most valuable phosphate mine yet discovered in

Canada, not only on account of the quantity and purity of the mineral, but from the fact of its being the most conveniently situated mine, within a stone's throw of the navigable waters of the Rivière du Lièvre, and not more than ten miles distant from the railway station. During the summer, each day's output has been sent forward, and in the winter season it will be delivered for about one-half the cost to other miners. There is, comparatively, but a small force of men employed at the mine, and yet the daily output amounts to 20 tons, and the body of ore in sight measures several thousand tons; in fact the wall has not yet been reached in any direction, and the bottom of the pit shows solid mineral.

THE "McLAURIN" MINE.

Of this mine little can be said that is not already known to people in any degree interested in the phosphate industry of this section. For some years past the repeated reports of practical men have characterized it as a property of great value and it continues to deserve the enviable reputation it has earned. Ever since it fell into the hands of its present owners a uniform annual output has been sent forward, and shipments have invariably analysed 85 to 86 per cent.

THE "POST" MINE.

situated in the Township of Templeton, not far distant from the McLaurin property, is sending a quantity of very fine phosphate to the front, and the mine is looking well; a large quantity of mineral is in sight, and development shows the deposit to be one of considerable extent and of a solid character.

OTHER MINES

continue to improve with development, and prospects are reassuring to their owners. The "Gemmell," the "Haldane," the "Jackson Rae," the "Moore," the "International" and many less important, and more recently opened mines are carrying on active operations; in fact from end to end of the County of Ottawa phosphate mining is being established on a permanent basis, and the force employed aggregates about 450 men, distributed, approximately, as follows: "High Rock" 70, "Union Phosphate Mining and Land Company" 60, "Emerald" 30, "North Star" 12, "Chapleau" 20, "Philadelphia Company" (Portland East) 20, "McLaren" 15, "French Company" 40, "McLaurin" 30, "International"

10, "Jackson Rae" 15, and at other mines about 100. A report has come in that the "Moore" mine in Wakefield, is opening up well, and that recent stripping has exposed large bodies of phosphate. This is comparatively a new mine and is capable, no doubt, of being vastly improved. With further development it will, of course, increase in value.

2nd Quality Phosphate.

A large quantity of low grade phosphate is lying at the mines, and many hundred tons have been delivered at point of shipment, but owing to there being no demand at present for "seconds," it is not being forwarded. This grade of ore is the refuse of the mines, or so mixed with rock and other impurities that miners have found it more profitable, while they had a market, to sell it at a low price than to pick it over and cob it. The demand having ceased, Mr. Allan, who has a large quantity at Buckingham Station, has set men to cob and clean up so as to raise it to the standard of first quality. This is unquestionably a wise move, and others might do well to benefit by the example.

Phosphate Quotations.

Prices have taken another drop and Canadian apatite is now quoted in London at 1s. for 75 per cent., which is equivalent, all charges accounted, to \$15 per ton at points on the Canadian Pacific Railway, for 80 per cent. mineral. The cause of this drop is not attributable to any special cause, and those who can afford to hold will unquestionably realize better prices for next season's delivery. Manufacturers in Europe are not anxious to buy at present, and recent sales have been made under pressure.

Transportation of Phosphate.

Messrs. Allen and Bothwell, owners of one of the steamers on the du Lièvre, are building a scow of 60 tons capacity for the accommodation of miners up the river. It is their intention to contract with owners of mines to deliver their output, during the season of navigation, at the Buckingham landing, from whence it will be forwarded to the railway station or Ottawa River in waggons, a distance of 3 and 4 miles respectively. The steamer, with the scow in tow, will make a daily trip to High Falls, and this extra facility for transporting ore will, undoubtedly, be a great convenience to the owners of phosphate mines contiguous to the river.

Weighing Phosphate.

Mr. R. Smith, agent of the High Rock Mine at Buckingham Station, is about to erect a Fairbank Scale at the entrance to the yard for the

accommodation of shippers. Herebefore the phosphate hauled to the Canadian Pacific Railway has been weighed in the waggons or sleighs at the village of Buckingham, and afterwards forwarded to the station. This has always been looked upon as risky, there being no check on teamsters after their load had been weighed until it was deposited in the bins at the railway, and, as it had to be carried quite 3 miles, the opportunities and temptations for dishonesty have been manifold. The proposed scales at the station will circumvent any contingency of this nature and, as they will be so erected that teamsters will drive on them on entering the yard and continue thence to the bins, they must prove a great convenience, and will supply a want long and seriously felt.

ANALYSES.

HOW SAMPLES OF PHOSPHATE ARE SELECTED FOR ANALYSIS IN ENGLAND AND ON THE CONTINENT.

As many of our readers are unaware of the *modus operandi* for the proper selection of samples from shipments of our phosphate for analysis, we herewith furnish full details of the manner in which it is carried out. The phosphate is discharged over the vessel in a shoot on to a wooden staging, from whence it is wheeled in barrows over the weighing machine, and then on to the warehouse. Every hundredth barrow load is, after being weighed, run into a small bed close by, the floor of which is stone, well swept, and quite dry and clean. The whole of the sample is well mixed together and put through a crusher, after this the sample is divided, and half put through the machine again; then, after well mixing, a tenth part is put through the machine, after which the sample is again divided in tenths, and one portion filled into clear dry glass bottles, sealed, and forwarded to the chemists selected for analysing. This information is given to us by one of the largest exporting houses in Montreal.

IMPORTANT SALE.

Mrs. E. W. Murray, of Buckingham, has sold her half interest in the "Emerald" mine to Mr. W. A. Allan, of Ottawa, for the handsome sum of \$40,000 in cash, the money having been paid on the 21st inst. Mr. Allan, who was part owner with Mrs. Murray in this mine, is now the sole proprietor of the most valuable phosphate mine in Canada, and has by this purchase added one more to the list of valuable mines of which he is the fortunate owner. He is to be congratulated on acquiring the proprietorship of this property, and Mrs. Murray has been very fortunate

in realizing such a handsome sum, in cash, for that portion of her late husband's estate which could not receive her personal attention.

ROADS.

Again it becomes necessary to direct attention to the bad condition of the road leading from Buckingham Village to the Railway Station. Shippers of phosphate are crying out for improvements, of a substantial and permanent character, that would render traffic more practicable. The owners of mines whose output must find an outlet over this road have, time and again, expressed a willingness to co-operate with the municipal authorities in making the much required improvements, but there has been no disposition shown to meet them half way. The amount of freight in the shape of lumber, phosphate and farm-produce that is daily hauled from the village to the railway is very great, and no temporary patchwork, such as has been done at odd times, since last spring, can be expected to stand the wear occasioned by such traffic. The wet fall weather is approaching, and, unless prompt attention is given to putting the road in good order, it will shortly become impassable for heavy freight. Let the ratepayers of Buckingham combine with the phosphate miners to devise some means of inducing the corporation to give attention to such important requirements of the municipality.

A NEW INDUSTRY

For the County of Ottawa.

That the articles which have appeared from time to time in the Review, setting forth the importance of the Canadian phosphate mining industry, are having a good effect, is made apparent by the many letters, asking for further information on the subject, which have been received, from the United States and England, at the Review office. We are now in receipt of communication from some scientific gentlemen, experienced in mining and treating minerals, asking for our views on the feasibility of, and the advantages that might be expected to attend, a new enterprise which they propose to inaugurate in connection with our phosphate industry—which is as follows. They propose to form a company with sufficient capital to enable them erect crushing and concentrating mills, with a view to the utilization of the waste phosphate rock which so rapidly accumulates about the mines. These gentlemen are holders for Canada of the patent of Paddock's Pneumatic Ore Separator and they profess to be able to utilize all rock containing 75 per cent. down to 20 per cent. of phosphate, and, by means of crushing and concentrating, to bring it up to 85 per

cent. standard. Their machine has been successfully in use for all kinds of minerals, and phosphate, though but experimentally, has been treated by it with success. The extensive graphite concentrating mills at Tyconderoga use this machine exclusively.

The phosphate rock treated by the above process, would of course be pulverized, and our correspondents state that it would ultimately be to the advantage of the Company to add plant for the manufacturing of super-phosphate.

This is a matter well worth the attention of owners of mines, and we will be obliged to them if they will formulate their views as to the practicability of conducting such an enterprise on a paying basis, and forward them to the REVIEW. Much will depend on the quantity of waste rock as above described; the intention of the promoters would be to purchase from owners at the mines or mill, and to treat it as their own property. They appear to be quite confident that, if the quantity of raw material can be had to keep the mill working, the Company would experience no difficulty in paying handsome dividends. We are of opinion that such an enterprise would be of enormous advantage to miners, as it would not only free their properties, to a great extent, of waste heaps, but would provide a convenient market for their second, third and lower grade ore.

MONTREAL HOUSE, BUCKINGHAM.

People who are interested in mining in the valley of the Rivère du Lièvre, and who have occasion to visit Buckingham, will regret to hear that Mr. J. W. Lynch, the popular proprietor of the Montreal House, will shortly retire from the business of hotel-keeping. For many years his house has been a favourite stopping place for mining men, and though it may fall into other hands, its former genial proprietor will be greatly missed. Mr. Lynch is now, and for sometime has been, Superintendent at the Emerald Mine, and has become so interested in his work, that it has effectually weaned him from any attachment he may have had for his former occupation. He takes with him the best wishes of all his old patrons.

MICA.

The production of mica promises to become one of Canada's important mining industries. During the past few months much attention has been given by explorers to searching for this mineral, and innumerable deposits have been discovered; many of these have proved to be valueless, some on account of its not appearing in paying quantities, and others owing to the inferior quality of the mineral. Some valuable

veins have, however, been found, carrying crystals from which large sheets of clear white mica can be obtained. One such vein occurs in the County of Ottawa, and, although the work of developing it has not yet been started, the surface indications are such as to allow of no reasonable doubt as to the quantity of marketable mica that can be mined. The specimens sent to this office with a description of the geological formation and diagram of the vein, lead to the belief that this property is one of great value. Another vein, though occurring in a different formation, is now being opened at a point on the Upper Ottawa, and the mica is above the average in point of size and clearness. The vein, which is well defined between granite walls, is of fair width at the surface, and extends for several hundred feet in length. What little work has been done on the vein goes to show that the crystals increase in size and are more compact below the surface, while the sheets become almost free from discoloration. But little more work on this property will be necessary to establish its value, and mica mining, once successfully begun, will rapidly become an industry in the district of as great importance as the mining of any other mineral.

THE HAYCOCK IRON MINE.

Negotiations with the English capitalists for the reorganization of the Ottawa Iron and Steel Manufacturing Company, and the resumption of work at the mine, have not yet been concluded. Every detail connected with the proposition that has been made to them is being carefully considered, and a thorough examination of the property by experts, sent from England for the purpose, has satisfied the people in England of the correctness of the statements and reports that have been laid before them. In view of this, it would be unreasonable to anticipate any hitch, and it is not unlikely that satisfactory terms will be definitely agreed upon within a short time, and the nature of same publicly announced.

NEW DISCOVERIES.

A report has reached us of a recent valuable discovery of silver in the Township of Grenville, County of Argenteuil, but we are not informed as to whether it occurs in native form, argentiferous galena, or as sulphuret of silver ore. Further particulars of the discovery will be looked for with much interest.

Recent discoveries of phosphate deposits in Florida have been purchased by the Ashley Phosphate Company, of Charleston, S.C., who value the property at a high figure, not only on account of the extent of the deposits, but owing to the grade

of the mineral, which has been pronounced superior to that of South Carolina.

Phosphate has also been discovered in North Carolina, similar in composition to the deposits of South Carolina. It is found to occur in the same formation and has been traced to various points in the State. No mining has yet been done and the extent of the deposits is therefore not determined.

Phosphate mining in the Southern States will in no manner affect the industry in Canada, as the mineral, which is of a much lower grade, averaging not higher than 50 per cent., finds a different market, and dealers have not yet been known to be in competition with shippers of Canadian apatite.

MINING NOTES.

Manitoba and Nova Scotia Gold Mines.

Rat Portage, District of Keewatin.

The contract work has been completed on the Minnisabic, and Messrs. Rideout and Gibbons are more than satisfied with the results.

The "Lake of the Woods Company's" property has for some time been idle, but hopes are entertained that work will be commenced on it within a few days.

The "Argyle Company" are steadily working on their property, and proving that, although far from being the richest vein on the lake, it is a good location, and will amply repay the work done.

The "Winnipeg Consolidated" have put in the water pumps and have placed in their mill the Caldwell Grinder and Amalgamator, by which it is expected to take over \$50 per ton out of the ore. The shaft is down 114 feet, and the vein is widened out to 6 feet.

The "George Heenan Company" are jubilant over the acquisition of a new mine, the "Red Star," said to be the mammoth vein of the lake. It is 40 feet on the face and at some points across the island measures 80 feet. The pyrites contains $23\frac{2}{3}$ per cent. of copper and \$118.93 in gold. Where the vein matter does not carry copper, it runs \$15 to the ton. Five dollars a ton will both mine and mill the rock. A number of Chicago capitalists are expected to take hold of the property. —*N.Y. Mining Record.*

The correspondent of the CANADIAN MINING REVIEW at Rat Portage, reports that, comparatively speaking, mining matters are dull in the district owing to the scarcity of money necessary for further development, rather than to any depreciation in the value or richness of the mines.

Nova Scotia.

OXFORD GOLD MINE.—The clean-up for the last week of August resulted in 114 ounces from 30 tons of ore, or about \$80 per ton.

SALMON RIVER MINE.—A bar of gold weighing 300 ounces and valued at about \$6,000 was the result of work at this mine during the month of August.

The "Sydney and Lewisburg Coal and Railway Company" has recently engaged in the manufacture of iron from the Cape Breton Island ore. The ore, as well as an inexhaustible amount of coal, is in large quantity on the island.

BRIDGEWATER.—A bar of gold weighing about 70 ounces has recently been forwarded from newly discovered lodes near Bridgewater, Lunenburg County. It is said to have been taken from 600 pounds of quartz, selected out of four or five tons of ore. If this statement is correct it would appear to yield a minimum of fourteen ounces per ton, which, if maintained, at once stamps the new field as one of the most valuable in the province. —*Ibid.*

BRUNSWICK G. M. Co.—This company is one of the few mining companies that seem to conduct their business on true business principles, and bids fair to be very remunerative to those interested. The property is a mile in length, 1,000 feet in width, with a 10-stamp mill, 30-horse-power engine, with buildings for the miners, blacksmith shop, etc., all in perfect condition. Their close proximity to Halifax by water enables stores, etc., to be cheaply and quickly transported. Three shafts are being sunk on the lode, and, although rich from the start, is improving in depth. Since the cleaning up in August the mill has been running on rich ore, and the plates indicate more than satisfactory results. Owing, no doubt, to judicious management this company's property appears to be one of the best paying mines in Nova Scotia. Two bricks, weighing 115 and 112 ounces respectively, have recently been forwarded from the mine to the head office of the company.

COXHEATH.—According to reports, work has been temporarily stopped at this copper mine. This is said to be in consequence of the large quantity of ore which has already been raised and hauled, the company not having fully decided whether to ship the ore abroad or have it smelted at Cape Breton. The mine is situated near Sidney, C.B., and, as has already been stated in the REVIEW, is owned by Bostonians. Reports of progress received lead to the conviction that this temporary suspension is attributable solely to the cause above mentioned and not to the development of any weakness in the mine.

IRON.

The quantity of iron ore that has been exported to the United States has been the means of establishing a reputation for the product of Canadian mines and, as a consequence, the sales of many iron locations have been reported. Information has been received, from an authentic source, to the effect that a number of Cleveland gentlemen, having formed a syndicate, have placed a large amount of money in iron mines in the Province of Ontario. The *New York Engineering and Mining Journal*, thus speaks of their prospects: "The iron range is 90 miles inland from Lake Ontario, and the area is supposed to be in the neighbourhood of 60,000 acres, part of which, however, is owned by Canadian and New York capitalists. The mines will be

reached by the Central Ontario Railway, which is now in course of construction, and which will have the entire monopoly of the carrying trade of all the mines. The terminus of the road is on Weller's Bay, the best harbour on Lake Ontario, and only 60 miles distant from Oswego, and about 36 miles from Rochester (this should be about 70). Extensive docks and ore-pockets have been constructed to facilitate the shipment of ore to the United States. The ore outcrops at considerable elevation, and, in order to secure a large output from the mines that have been started, it will not be necessary for some time to erect expensive plant. The mines have already been located, and the output the first year the road is completed will be somewhere in the neighbourhood, it is thought, of 100,000 tons. The whole matter is yet in such a shape as to give very little idea of the resources of the beds. It will be some time

before the Central Ontario Railway is completed, and until then operations cannot be commenced. Samples taken from a number of localities on the range show magnetic and Bessemer ore of the finest quality. The Cleveland syndicate starts out with a capital of \$2,000,000."

This augurs well for the future development of the iron mines in the district referred to, and, as the gentlemen composing the syndicate have already invested a very large amount of money in the construction of the extension of the Central Ontario Railway, it is more than probable that work at the mines will be vigorously pushed, as the ore will be the principal freight carried on the road, and its main support.

The extension of the Kingston and Pembroke Railway, now in course of construction, penetrates a section of country where extensive deposits of magnetic and hematite iron ore have been discovered, and

which have attracted much attention since the location of the railway through the district. In the Township of Bagot, the ore carries a high per centage of metallic iron and the outcroppings indicate almost inexhaustible deposits; analyses show the ore to be exceptionally free from objectionable features, and there exists little doubt in the minds of experts that the locality lying to the north of Kingston, and traversed by the above mentioned railway, is capable of producing iron ore of as high grade and in as great quantity as any other section of Canada. The lake terminus of the road at Kingston is not more than 65 miles from Oswego, so that the mines will be conveniently situated for transportation of ore to the United States. A number of deposits have already been located in this section, and it is not at all improbable that active mining operations will be begun within a short time.

ANALYSES OF CANADIAN IRON ORES.

The following tables, compiled from different sources, will serve to illustrate the composition of Canadian magnetic and hematite ores.

TABLE OF ANALYSES OF MAGNETITES.

CONSTITUENTS.	I.	II.	III.	IV.	V.	VI.	CONSTITUENTS.	VII.	VIII.	IX.	X.	XI.	XII.
Peroxide of iron.....	73.90	93.82	66.20	69.77	90.14	72.80	Peroxide of iron.....	89.22	58.35	59.39	80.76	65.44	90.36
Protoxide of iron.....	none.	0.12	17.78	.....	traces.	.....	Protoxide of iron.....	none.	24.87	26.93	13.59	14.50	.....
Oxide of manganese.....	0.61	0.79	traces.	5.65	1.33	.....	Oxide of manganese.....	none.	0.13	traces.	0.06	0.11	0.17
Alumina.....	none.	0.45	1.85	.....	0.82	1.69	Alumina.....	none.	0.42	0.67	0.71	0.60	.....
Lime.....	1.88	0.94	0.18	4.50	0.84	6.86	Lime.....	none.	1.43	0.33	1.30	3.90	3.04
Magnesia.....	0.027	0.08	0.015	0.085	0.007	0.035	Magnesia.....	0.012	2.56	0.82	0.45	0.45	traces.
Phosphorus.....	0.085	0.11	0.28	1.52	0.12	0.027	Phosphorus.....	0.073	0.07	traces.	0.21	traces.	0.19
Sulphur.....	.....	.....	1.17	.....	.....	1.50	Sulphur.....	.....	0.04	0.07	0.04	2.74†	0.005
Carbonic acid.....	20.27	3.75	11.11	7.10	.....	.....	Carbonic acid.....	.....	.....	.....	.....	1.64	.....
Silica.....	none.	.....	none.	9.80	1.03	.....	Silica.....	.....	11.17	.....	0.01	11.45	.....
Titanic acid.....	.....	.....	0.71	.....	.....	.....	Titanic acid.....	.....	0.73	3.23	none.	none.	none.
Graphite.....	3.27	.....	.....	2.45	.....	3.50	Water.....	.....	.....	.....	0.22	0.14	.....
Water.....	.....	.....	.....	.....	5.25	14.73	Organic matter.....	.....	.....	.....	0.04	.....	.....
Insoluble matter.....	100.042	100.06	99.295	100.875	99.537	101.142	Insoluble matter.....	10.42	.....	8.33*	2.75	.....	6.50
								99.725	99.77	99.82	100.14	100.97	100.265
Metallic iron.....	53.51	67.94	60.17	50.52	65.27	52.72	Metallic iron.....	64.61	60.19	62.52	67.10	58.37	65.43

* Silica and insoluble rock matter.

† Bisulphide of iron.

TABLE OF ANALYSES OF HEMATITES.

CONSTITUENTS.	I.	II.	III.	IV.	V.	CONSTITUENTS.	VI.	VII.	VIII.	IX.	X.
Peroxide of iron.....	84.42	84.10	88.08	89.80	85.45	Peroxide of iron.....	82.25	86.80	75.67	92.01	96.63
Protoxide of iron.....	.....	.....	6.86	7.06	5.24	Protoxide of iron.....	.....	.....	.....	.....	0.89
Protoxide of manganese.....	.....	.....	0.24	trace.	0.15	Oxide of manganese.....	.....	.....	0.52	2.16	.....
Alumina.....	.....	.....	.....	.....	.....	Alumina.....	.....	.....	0.45	0.21	.....
Lime.....	3.02	4.93	0.55	trace.	0.41	Lime.....	trace.	none.	1.37	0.71	.....
Magnesia.....	0.50	.....	0.13	0.22	0.17	Magnesia.....	.....	.....	0.46	0.20	.....
Phosphoric acid.....	0.03*	.....	0.16	trace.	0.13	Phosphoric acid.....	0.026*	trace.	0.22	0.08	none.
Sulphur.....	0.065	.....	0.03	trace.	0.07	Sulphur.....	0.092	0.29	0.16	0.06†	.....
Carbonic acid.....	2.93	3.87	.....	.....	.....	Carbonic acid.....	.....	1.59	0.79	.....	.....
Silica.....	.....	4.00	.....	.....	.....	Silica.....	.....	19.43	3.68	3.20‡	.....
Titanic acid.....	.....	.....	3.17	2.34	2.12	Titanic acid.....	.....	.....	trace.	tracc.	.....
Graphite.....	.....	.....	0.35	0.43	0.28	Water.....	0.66	.....	.....	.....	.....
Water.....	.....	.....	.....	.....	.....	Insoluble matter.....	16.05	12.75	.....	.....	.....
Insoluble matter.....	7.16	.....	0.26	0.11	5.77						
	98.125	96.90	99.83	99.96	99.79		98.986	99.642	100.00	100.00	100.78
Metallic iron.....	59.09	58.80	66.98	68.34	63.88	Metallic iron.....	57.60	60.76	54.36	64.41	68.83

* Phosphorus.

† Pyrites.

‡ Silica and insoluble matter.

A GREAT MINE'S OPERATIONS.

(From New York Mining Record).

At the recent meeting of the shareholders in Boston of the Calumet & Hecla Copper Mining Company, 81,490 out of 100,000 shares were represented; the old board of trustees was unanimously re-elected. It consists of Alexander Agassiz, Quincy A. Shaw, H. H. Hunnewell, George Higginson, James N. Wright, all of Boston or its suburbs, except Mr. Wright, of Michigan.

At a subsequent meeting of the directors, Alexander Agassiz was re-elected president, and Chas. W. Seabury, secretary and treasurer.

According to the financial statement, \$1,250,000 has been paid within the financial year ending April 30th, for 120 acres of land purchased—a property worth to the company more than \$5,000,000. The opening on the south part of the property is being done "little by little" and the product of 50,000 tons of rock, secured in opening, has paid a profit of about \$20,000. This new property will come in as a "reserve" when the old mine is "worked out," but in making this statement, President Agassiz did not name any particular date for that event of the future. Included in the extra expenses was the purchase of a large tract of timber and for the use of the mine, which is now well supplied. They are using less and less wood for fuel, coal being substituted, and the principal demand for that purpose now is the supply for family use. The demand for timber for use in the mine, is naturally large.

The following statement of the assets and liabilities for three years, will give a condensed view of the general results of its business.

ASSETS AND LIABILITIES.

	1881.	1882.	1883.
Total assets.....	\$3,151,790 38	\$3,912,038 26	\$2,438,674 11
Less liabilities.....	668,914 24	432,725 70	452,849 58
Surplus May 1.....	\$2,882,876 14	\$3,479,312 56	\$1,980,824 53
Div. due May 15.....	500,000 00	500,000 00	500,000 00
Actual net surplus.....	\$2,382,876 14	\$2,979,312 56	\$1,480,824 53
Increase or dec.....	dec. 31,795 58	inc. 596,436 42	*dec. 1,498,488 03
Profits of year.....	\$1,968,205 42	\$2,596,436 42	*See note.
Dividends paid.....	2,000,000 00	2,000,000 00	\$2,000,000 00

The annexed statement of the product of the mine for four official years, given in monthly figures, as actually smelted, shows the magnitude of the property and its resources, being more than an average of 1,310 tons of ingot per month in 1882-83.

	1879-80.		1880-81.		1881-82.		1882-83.	
	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.
May.....	1,411	1,096	1,713	1,538	1,764	1,019	1,906	1,610
June.....	1,326	188	1,727	953	1,763	898	1,679	1,840
July.....	1,397	105	1,672	1,099	1,635	1,817	1,482	455
August.....	1,397	879	1,701	1,645	1,818	339	1,771	174
September.....	1,444	1,649	1,684	881	1,612	1,437	1,764	748
October.....	1,446	482	1,750	822	1,709	959	1,624	1,651
Six months.....	8,405	399	10,250	928	10,304	469	10,329	478
November.....	1,617	320	1,665	1,304	1,652	173	1,708	1,309
December.....	1,737	1,253	1,703	1,570	1,734	252	1,530	1,824
January.....	1,761	1,557	1,659	207	1,691	1,432	1,655	1,195
February.....	1,519	951	1,435	1,835	1,713	1,799	1,518	1,699
March.....	1,733	164	1,710	1,496	1,908	707	1,935	1,908
April.....	1,701	972	1,881	1,797	1,901	353	1,713	1,067
Total.....	18,465	1,616	20,290	1,137	20,905	1,187	20,392	1,480
Per cent.....	77.32		77.86		76.95		77.06	
Ingot, tons.....	14,277	1,435	15,797	1,300	16,094	1,985	15,714	258
Ingot, pounds.....	28,555,425		31,595,300		32,189,985		31,428,258	

The above figures are given in a manner to conform to the fiscal year of the company, which ends April 30th. Annexed are the figures for the first six months of each calendar year from 1879. The figures given are officially smelting returns, which run about five per cent. ahead of the product, as published each month.

	1880.		1881.		1882.		1883.	
	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.	Tons.	lbs.
January.....	1,751	1,557	1,152	207	1,691	1,431	1,655	1,195
February.....	1,519	951	1,435	1,835	1,713	1,799	1,518	1,699
March.....	1,733	164	1,710	1,496	1,908	707	1,935	1,908
April.....	1,701	972	1,881	1,797	1,901	355	1,713	1,067
May.....	1,713	1,528	1,764	1,019	1,906	1,610	1,915	1,977
June.....	1,727	953	1,713	898	1,609	1,840	1,740*	1,558
Total mineral.....	10,147	125	10,208	7,252	10,728	1,742	10,480	1,404

*There is an apparent decrease in assets of \$1,498,488.03, and the net profits of the year would appear to be only \$501,511.97, against \$2,000,000 paid in dividends, but \$1,250,000 was paid for lands purchased last year, and probably \$100,000 to \$150,000 additional extra expenses.

*Five per cent. added to the June product which the smelting return will over-run to that extent.

THE GOLD FIELDS OF CANADA.

Gold mining in Canada is, for the most part, in its infancy, and her gold fields are not yet in a position to admit of a fair comparison with those of other countries where all the appliances which art, experience and money can bring to bear have long been in operation. Until within a few years ago our miners were unskilled and the machinery employed at the mines was of the most crude and cheapest description. This state of affairs is, happily, giving way to the introduction of modern machinery, while the management of the mines is being transferred to practical and scientific men, and the result will soon be felt. From the Atlantic to the Pacific Oceans, in every province of the Dominion, excepting Prince Edward Island, gold has been discovered to exist in paying quantities in auriferous alluvions and in quartz. In

Nova Scotia

the discovery of gold was first made known in 1860, and it has since been traced over an area of quite 5,000 square miles. The principal gold mining districts in this province are: Cariboo, Moose River, Fifteen Mile Stream, Gray's River, Lawrencetown, Montagu, Waverley, Oldham, Renfrew, Sherbrooke, Isaacs, Stormont, Wine Harbour, Tangier, and Mount Uniacke, while the existence of gold is reported in numerous other localities. In

New Brunswick

no gold mining has yet been done, though it has been discovered at several points on the coast, in Albert County and in the Tobique River, a northern tributary of the St. John. Indications lead to the belief that the quartz veins of the Province of Quebec extend across the central part of New Brunswick, in the direction of the Bay of Fundy, and this is not improbable. In the

Province of Quebec,

gold has been traced over an area of 15,000 square miles, bounded to the north by the Notre Dame Range of Hills, to the south by the International Boundary Line, and extending east and west from the headwaters of the Rivière du Loup (*en bas*) to Lake Champlain. Of this, about 4,000 square miles are the richest, and contain the metal in the form of alluvial gold, quartz and gold bearing black sand. This area embraces the beds of the Rivers Chaudière, Des Plantes, Gilbert, Famine and Du Loup (*en haut*) where alluvial gold mining was carried on in a primitive way for years at a fair profit. The gold fields of this province are capable of yielding metal at a fair profit if they were in the hands of experienced and practical men with the means to enable them to prosecute mining operations to the best advantage. In the

Province of Ontario,

the region embracing gold is supposed to extend from Madoc to the

northern shores of Lake Huron, but the richest and paying deposits occur in the Townships of Madoc, Elgin, Hungerford, Marmora, Lake and Tudor. There are no alluvial deposits in this district, the gold appearing in brown ferruginous earth in crevices of the rocks, in quartz and sulphurets and associated with antimonial grey copper ore. Further to the west, in the Province, it is thought probable that gold will some day be added to the mineral riches of Lake Superior, and already active gold mining operations are being carried on on the Lake of the Woods, and at Rat Portage, with most promising indications. The last mentioned locality is in disputed territory, and may some day belong to the Province of

Manitoba,

where important gold leads have been found during the past few years. Prospectors are still busily engaged in exploring the Province, and new discoveries are almost daily reported. Some valuable mines are being already worked, at which expensive machinery has been erected during the past summer, and gold mining in Manitoba bids fair to becoming an important and very profitable industry. In the

North-West Territory,

traces of gold have been found a short distance south of Great Whale River, on Dog Island, near Cape Jones, and in the Little Whale River Valley. On the North Saskatchewan gold is found, more or less, below the mouth of the Brazeau, on the bars and in the river banks. It occurs in the gravel in the bed of the South Saskatchewan, about Edmonton and in the Peace River district. In

British Columbia,

it may be said, without exaggeration, that there is scarcely a stream of any importance in the Province in which the "colour" of gold cannot be found. Its discovery, first made known in 1858, led to the influx of miners during that and the following year. Gold, thus the first cause, attracting attention to the country, has ever since been an important factor in its prosperity. The Cariboo, Kootenay, Omineca, Cassair, and the Fraser River districts, as well as the Leech River district in Vancouver Island, have been the chief centres where gold mining has been carried on. The alluvial deposits have so far absorbed the mining energy of the country, but attention cannot be too soon or too carefully directed to the more permanent quartz mining, as it would give a more reliable character to the industry and would indirectly tend to cheapen labour by affording steady employment. In the discovery and development of her gold mines, British Columbia has laboured under many disadvantages, such as their inaccessibility and the cost of labour and supplies. The condition of the Province is rapidly changing, however, and the

increased facilities for communication, together with the rapid growth of farming settlements, will do much towards removing many of the difficulties which have heretofore retarded the development of the mining interests.

LAKE SUPERIOR COPPER MINES.

The multifarious uses for which the mineral can be employed and the cheapness of its production renders copper-mining one of the most lucrative fields for capital, and the Lake Superior region is being proved one of the most productive of this metal. Hitherto our neighbours in Michigan have carried off the palm for copper production, but there are indications that Canada has entered the lists, and that she will make a fair exhibit before many years is not at all improbable.

Two English companies have commenced the development of the native copper deposits on the north shore of Lake Superior viz: "The Michipicoten Copper Company," at Michipicoten Island, and "The Lake Superior Native Copper Company," at Mamainse. These companies have been engaged during the past eighteen months in equipping their mines where mining operations have, so far, met with most flattering results. Each company has expended over two hundred thousand dollars on its property, and they have now reached the point when handsome returns will reward them for their large outlay. The crushing mills and dressing floors at Mamainse will be in operation this month, and we learn that sufficient ore is in sight to keep the stamp mill running for two years, while new ground is being opened. This company expects to double the capacity of its mill next spring by the addition of a ball stamp. About 160 men are employed at this mine; a post office has been established, and the number of buildings that have been erected for the accommodation of the employés and other uses, present the appearance of a village where, but a short time ago, a barren wilderness existed. The steamer *Steinhoff* has recently been purchased by the company; she is capable of accommodating sixty to eighty passengers, as well as about two hundred tons of freight, and will ply between the mine and Sault St. Marie, and probably Michipicoten, supplying a want long felt by fishermen and miners in the vicinity.

"The Michipicoten Company," although somewhat more tardy in getting its crusher in operation, gives assurance of a prosperous future, if we may judge from the mineral now being taken from the shafts, specimens of native copper ore from which, weighing from $\frac{1}{4}$ to 10 and 12 lbs., have been received at the office of the Managing Director, in Montreal, where we had the opportunity of inspecting

them. This company has all its surface work completed and is now directing its attention to opening up the mine, where about 60 men are employed. We are informed that the company purposes starting its new Crushing Mill next spring, by which time sufficient ground will have been opened to insure its continued working.

Both of these companies are prosecuting their mining operations with the most approved rock drills and air compressors, with which treble the amount of work can be accomplished, in the same time, as formerly. We will keep our readers informed, from time to time, of the progress of this important industry, the value of which, to the country, can scarcely be overestimated. The successful prosecution of mining in, and the extension of railway facilities to, the Lake Superior region is all that has been requisite to open up to capital and enterprise this extensive mineral field which, until now, has been looked upon as quite inaccessible.

TO ENGLISHMEN AND ANGLO-CANADIANS.

The Mineral Resources of Canada.

That Canada is, day by day, growing in importance, in the eyes of capitalists and scientists of other countries, as a field for the investment of foreign capital, is fairly demonstrated by a letter, under the above heading, which has recently appeared in the *Mining Journal*, London, England, as follows:—

SIR,—As this subject may interest many of your readers, I have forwarded you some practical hints, which may be turned to suit the requirements of the present time, so as to hasten the development of what may be the most valuable portion of Canada, and which has not been especially named by previous writers on mining subjects. You will see by the enclosed complimentary article of April 6th, 1878, from the *Mining and Scientific Press*, of San Francisco, that the opinions expressed in my "Explorers', Miners' and Metallurgists' Companion," published so far back as the year 1869, as to where extensive mining fields would be found on this Continent, have been, in all cases, fully realized in and across the United States on the several slopes of the northerly trending mountains and their foot hills, as therein more particularly named. The chief reasons for this present communication, are to show, so far as proved in the United States, even up to points very near its northern boundary, that these predictions have been practically demonstrated by innumerable operations and very large profits; secondly, to repeat these statements and call renewed

attention to the established facts that the same mountain ranges will carry similarly favourable analogy northward in their courses through British possessions.

The Americans are the best prospectors for mineral in the world, and have, during the period named above, performed an amazing amount of exploration work, and made many valuable discoveries. The trans-continental railway of Canada will enter into and cut its way across—or in a mining manner, costean—the whole mountainous portions of the country, and will soon enter the wide and most interesting mineral zones of the Rocky and Wasatch mountains, where intelligent observations and explorations will, in my opinion, cause Old England to be once more proud of Colonial wealth.

This field for mining, with mountains running over 1,000 miles northerly, the whole breadth of the Canadas, will probably extend across the longitudes of Western Dakota, Montana and Idaho, of the United States of America, but for lode or vein mining will not reach so far west as Cariboo in British Columbia, as the Sierra Nevada chain of mountains is thereabout broken and detached for a few hundred latitudinal miles. This does not prevent the possibility of auriferous discoveries in gravel formations, which are very likely to be found in many valleys that have received the water washed debris from the western declivity of the previously named mountains along the route. I have been frequently questioned by letters from England: Where is the best place to explore for minerals? and I answered both English and Canadians—Prospect the breadth of the Canadas on either side of the advancing railway, but more particularly opposite to Western Dakota, Montana and Idaho, for vein mining, and thence westward for gravel and placer gold, where vast mineral areas lie unexplored.

When this railway is sufficiently far advanced, the north and south branches of the Saskatchewan River, the Arthabaska, and Peace Rivers, and the Rivers Laird, Peel, and McKenzie, will be found also convenient for both prospecting and power for mining this 1,000 miles long of the east slope of the Rocky Mountains, whilst the five branches for mining the head waters of the great Yukon River may be utilized for the north-western slope with its spurs and parallel range. A few brave and strong men may make immense fortunes along this range of mineral-bearing strata. I know of no other unexplored belt in North America that exposes superior inducements, and there is probably nothing on this continent but the unexplored eastern slope of the mighty Andes, which extends 4,000 miles from north to south through the several rich countries of Columbia, Ecuador, Peru, Bolivia, the Argentine Republic, and Patagonia;

but Canada has the great advantages of your own language, laws, and flag; whilst these are mostly inaccessible, and more particularly so to foreigners.

I have not the slightest interest in this matter beyond goodwill for my countrymen; but, having during the last 18 years travelled over North America, and studied its mineral formations as much as but few men, and feeling certain that this region will be found valuable, I perform this pleasant duty of publication.

J. S. PHILLIPS,

State St., New York.

August 4th, 1883.

The article referred to in the former part of the above letter as having appeared in the *Mining and Scientific Press*, of San Francisco, April 6th, 1878, was reprinted by the *London Mining Journal*. It gives Mr. Phillips much praise for familiarity with the geological condition of North America, evidenced by subsequent events which have so largely verified opinions advanced by him in his "Explorers', Miners' and Metallurgists' Companion," published in 1869.—[Ed.]

OTTAWA & GATINEAU VALLEY RAILWAY.

*The work of construction is being pushed ahead, and about five miles of the road-bed is already graded, notwithstanding that the Contractors and the Company have been severely handicapped by the many obstacles that have been thrown in their way by property owners along the line. Much difficulty has been experienced in acquiring the right-of-way in consequence of the unreasonable prices demanded for land. It would appear that the residents of that section of country to be traversed by the railway were indifferent to the many advantages they and the public at large will gain by having railway communication, and that they were ignorant of the fact that the construction of the road will enhance the value of their property to a very great extent. It would not have been expecting too much if the Company had looked for a free grant of the right-of-way from one terminus to the other, including the land necessary for station grounds; but they did not ask for this, and have been disposed to pay very liberally for all the land it is necessary for them to acquire, and that the progress of the work should be retarded by the exorbitant demands of property owners is to say the least, unreasonable, and shows a great lack of public spirit and an absence of fair and honest feeling on the part of those who have been instrumental in occasioning delay. That the road will be ultimately completed, despite a

obstacles of this nature, no doubt exists, and it is not at all unlikely that those very people who have been the prime movers in an endeavour to hamper and embarrass its promoters will derive the greatest benefits from the advantages and accommodation the railway will afford.

READ THIS!

(From the Chicago Mining Review.)

"The chief factor in the development of the mining industry of any locality is the unappreciated and usually poorly sustained local paper. The true value of mining claims, the advantage to capitalists, the rich strikes of well conducted properties all fail of their legitimate influence if the fact is not made known outside of the narrow circle of isolated localities. As important as is the local and special press to the mining interests, it has been proven in a thousand cases, no other business expects so much or pays so little to the very right arm of its success. Papers that have earnestly and faithfully laboured to attract the attention of capital and to build up on a permanent basis the mining industry of a camp, have been left to starve and die in the place that they have done so much to establish. No other business expects gratuitous advertising, and it is a short-sighted policy for miners and mining companies to neglect the best, and in many instances the only means that can be used to advance the interests of the camp and industry."

Subscribers to the CANADIAN MINING REVIEW are not as numerous as they might be, and correspondents are not prompt in reporting progress at the mines. We look for reform in both particulars. [Ed.]

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Lot " 1, " 12th "

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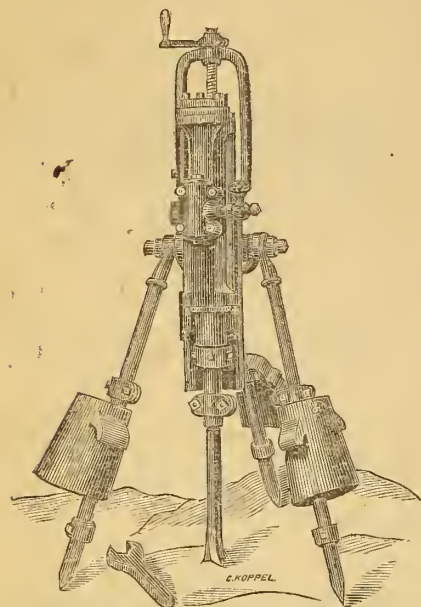
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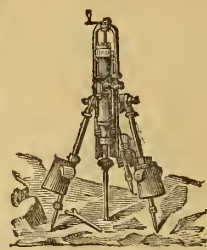
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E $\frac{1}{2}$ of N. W $\frac{1}{4}$	15	16	80
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CANADIAN MINING REVIEW

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OTTAWA, OCTOBER, 1883.

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The CANADIAN MINING REVIEW is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts as well as others interested in Canadian Mineral Lands are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 20th of the month it is to appear.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

CANADA is now, and for some time has been, making rapid strides towards the development of her mineral resources, and in almost every Province of the Dominion a vast amount of capital is employed in mining operations and in the reduction of the product of the mines. In Nova Scotia, Quebec, Ontario, Manitoba, the North-West Territories and in British Columbia, discoveries are made, almost daily, of economic mineral deposits, and foreign capital is not unavailable for their immediate development. As it has been in other countries, where mining is carried on to any extent, so has it been in Canada; many

mines have proved unprofitable and much money has been wasted through inexperience and the absence of suitable machinery for the proper treatment of the ores mined. That some, in fact many, of the properties, long since deserted might to-day be worked to advantage with the modern improvements in machinery and the facilities afforded by the advancement in science, there is not the slightest doubt, but a property once abandoned is afterwards looked at with suspicion, and it requires more than ordinary courage to endeavour to revive what has for years been looked upon as a "dead horse." Some mines, however, that had lain idle for a quarter of a century, have been reclaimed within the past few years, and work resumed with most satisfactory and encouraging results to those who were not tardy in seeing where the original operators had fallen into error and where discarded ores had become valuable under modern treatment. People of to-day who are disposed to engage in mining enterprises have many advantages that were denied the pioneers of the industry, from whose experiences valuable information can be derived. With the use of the Diamond Drill, prospecting can, in many localities, be reduced to a minimum of cost; steam drills and powerful explosives are important factors in the reduction of the cost of mining; recent scientific discoveries by chemists, metallurgists and mechanical engineers, render the reduction of ores less expensive, and the rapidly increasing demand, through the many new uses to which various minerals are applied, combine to increase

the value of the mines' production, and to offer better inducements for the investment of capital in mining enterprises of the present day than at any former period.

The mineral deposits of economic extent, that are distributed from ocean to ocean over the Dominion of Canada, comprise a large portion of her natural wealth, and the forming of companies and the importation of foreign capital, for the purpose of developing this wealth, should be with a view to the permanent working of our mines on a fair mercantile basis rather than with the expectation of reaping immediate fortune. Bonanzas are not to be found every day, but prospectors are ever searching with the hope that each day brings them nearer to fortune, in consequence of which mineral deposits of extraordinary richness are occasionally, though not frequently, met with.

It is but natural that, during a mining boom, people should be apt, under excitement of the moment, to exaggerate the importance of discoveries in which they are personally interested, but all those who have Canada's interests at heart should aid in suppressing the organization of wild-cat schemes and the operations of intriguing manipulators. If Canadian mine owners adopt an honest policy at the outset, in their transactions with the public, it will lead to the establishing of confidence abroad, and continued prosperity for themselves and their fellow countrymen will follow.

The Engineering and Mining Journal, New York, in its issue

of October 13th, publishes, editorially, as follows:—

"Those who have invested capital in the phosphate lands of the Province of Ontario are considerably alarmed at a recent decision in the Quebec courts. The Local Legislature had passed an Act cancelling the title to certain Crown Lands, on the ground that the necessary settler's improvements had not been made, and had sold them as phosphate lands. This Act has now been set aside by the courts, and, should their decision be sustained, on appeal, by higher courts, the titles, under which many phosphate mines are worked by American capital, would be destroyed."

There is no doubt that the recent decision of Mr. Justice Macdougall, at Aylmer, in the case of Holland Brothers vs. Ross, involves a nice point, bearing on the administration of Crown Lands in the Province of Quebec. The judgment sets aside an Act of the Local Legislature cancelling the titles to certain Crown Lands in the County of Ottawa, on the ground that the necessary settlement duties had not been performed in conformity with the conditions governing the grants. This Act applies to thousands of acres of land, and if Judge Macdougall's decision holds good in one case, it must nullify the legality of the Act as affecting all other lands similarly held. The Local Government were not a party to the suit, and allowed it to be conducted as between individuals, but, as the Judge's decision has brought the constitutionality of the Act into question, it will be tested, if necessary, before the highest tribunal, in the interests of the Province, and it is not improbable that this recent decision will

be reversed, and the title to the phosphate lands, referred to in the *Engineering and Mining Journal*, thus ratified; in the meantime there is no cause for alarm. That any action of the Quebec courts could affect the titles to Crown Lands in Ontario is impossible, and the allusion to them in the article published in the *Engineering and Mining Journal* is an error.

THE OUTLOOK FOR PHOSPHATE MINING IN CANADA.

In the September number of the REVIEW, reference was made to the high standard of the summer's shipments of phosphate from Canadian mines, as shown by analyses returned by English buyers. Communications received from London and Liverpool during the month are less satisfactory, as they report the recent receipt of several heavy shipments of ore which, upon being analysed, proved to be of an inferior grade, and had much to do with the falling off in the demand for Canadian phosphate in the English market. This unfortunate circumstance is due in no measure to inferiority of the deposits, but can be attributed exclusively to a desire on the part of miners to increase their output beyond the capacity of the mines. No greater mistake can possibly be made, and it becomes necessary to reiterate the advice already frequently given to owners of mines, to economize neither time nor labour in separating their ore from refractory matter and other objectionable matrix. The complaints that have reached us from abroad are of a very serious nature, and consignees, in criticising recent shipments, describe the mineral as being badly mixed with iron pyrites and mica, and to such an extent that some manufacturers who purchased have been exposed to serious extra expense in its manipulation. This attempt to increase the bulk of shipments is a shortsighted policy, and is having the

effect of prejudicing manufacturers against Canadian phosphate and of lowering its value in foreign markets. That all miners should suffer from the carelessness of the few is unjust, but, unless prompt steps are taken to prevent low grade mineral from going forward as "1st quality," such will be the inevitable result, and this important industry will be permanently injured. Canadian apatite can be shipped as free from refractory matter as can that from any part of the world, and the expense of cleaning up, so as to bring it to a high state of purity, is much more than counterbalanced by the increased value of the output. During last year one of the most valuable mines of Ottawa County produced a large quantity of ore, and the shipments during the summer show by analyses a variation of seven per cent., all taken from the same deposits. The mineral from the mine referred to should run of a uniform grade of not less than 82 per cent, whereas some of the cargoes sent forward returned analyses varying from 72 to 79 per cent., showing plainly that some one had been responsible for gross carelessness at the mine.

The mines are to-day more capable of producing high grade mineral than they have ever been, and they are yielding abundantly. Owners are equipping their properties with machinery suitable for carrying on permanent operations, and many of them are introducing valuable facilities for the more expeditious and economical handling of the output. The market abroad shows signs of improvement; higher figures are already offered for next spring delivery, and there is every reason to believe that prices will range as high during the winter as they did during the same season a year ago. Much, however, will depend on the quality of the ore sent to point of shipment, as it will there undergo close inspection before being forwarded, so as to avoid a repetition of the recent experiences above referred

to. Let miners look carefully to their own interests, and those of others, and not jeopardize future prospects nor depreciate the value of their properties by shipping phosphate of an inferior grade.

THE MINES.

Nothing could be more encouraging than the present appearance of the mines in the Ottawa district, and owners have begun to prepare for work during the approaching winter. During the autumn season much new ground has been prospected and many promising deposits have been discovered which will afford employment for a large number of miners. At

"HIGH ROCK"

nothing of importance has taken place during the month. The output continues much the same as formerly, viz., about 15 tons daily, and it is not improbable that this will be the average yield for some time to come.

THE UNION P. M. AND L. COMPANY'S

property adjoining "High Rock," is developing as well as could be expected, in fact the most sanguine members of the company could not but be highly pleased with what has been accomplished since the company broke ground last spring. The deposits continue to increase in size as work proceeds, and many new openings of a promising character have been made on the property, while the improvements, in the shape of buildings, docks and a tramway, do much credit to Captain Smith, under whose immediate supervision this work has been carried on. Stockholders and others interested in this company's prosperity will do well to visit the property and judge for themselves of the extent of the developments and of the substantial character of the improvements. A large quantity of mineral is being raised daily and is being forwarded in a state of purity that does credit to the manager of the mine, and that will establish a reputation for the property.

"NORTH STAR."

At this mine a shaft is now down 30 feet in phosphate and several new deposits have been met with equal to, if not better than, anything that has yet been discovered on the company's location. To work this property to advantage at least 100 men might be employed as it has been put in good shape to ac-

commodate a large force. We learn that at present not more than 20 miners and other labourers are engaged, which is, to us, unaccountable for we look upon the property as next, in yielding capacity, to the "Emerald," and when properly developed it will prove to be of great value. We have pronounced the mineral already shipped from this mine of exceptionally high grade, and in this particular there is no falling off in what is being now raised.

THE "EMERALD"

is looking as rich as it ever did, and the quantity of mineral raised each day is about twenty tons, or much the same as it has been for months past. The quality of the mineral is above the average, and, as it is being carefully picked, there is little doubt but that shipment will run uniformly 82 per cent. This mine is now well known to phosphate miners, and it is generally conceded by them to be the most valuable property in the district. Certainly no property has yet been developed that is capable of yielding the same amount of high grade ore at small cost. With proper management there should be nothing to prevent the ore being mined and delivered at the railway depôt at a maximum cost of \$4.00 per ton, and taking this as a liberal estimate, it will not be difficult to calculate the net daily profits on the output.

THE "MCLAURIN" MINE

continues to give employment to a fair force of men and yielding freely, there being apparent diminution in the quantity of ore in sight nor in the daily output. The mineral hauled out of the same high grade as is cobbled to the uniform standard that has long since maintained the output from this mine superior in the English market.

THE "POST" MINE

shows no signs of weakness; it is equally productive as it has been at any past period; the mineral is of almost a similar grade to that of the McLaughlin Mine, but that less care is taken by those in charge at the mine to forward it in as high a state of purity is visible to anyone who may have inspected that portion of the summer's output lying at Templeton Station.

THE "HALDANE" MINE

is yielding well, but the ore taken from some of the pits is not as clean as could be wished. Other pits are, however, sending out very good mineral.

and by keeping them separate, as two distinct grades, the owners need not suffer from the inferiority of one. The property is capable of producing large quantities of 1st and 2nd quality, and, ere long, it is to be hoped a convenient market will be established for low grade ores from all the mines in the district.

THE "GEMMILL" MINE

is looking better to-day than at any time during the past year; in fact, it may be said that those in charge are of opinion that heretofore they have been working on mere spurs, or strings, and that present indications lead them to the belief that they are only now approaching the main body. This has been a very profitable property to its owner. Several thousand tons have been shipped and the quality of the mineral is of a very high grade—shipments having run uniformly about 83 per cent.

OTHER MINES

have done nothing of much importance during the month, though report of progress is very satisfactory, and a large amount of mineral is accumulating for winter transportation to points of shipment. The average yield continues to be about the same, and the popular opinion is that the Canadian Pacific Railway Company will be compelled to provide increased facilities at the stations for stowing the output until it can be forwarded. The company have already received applications from four mine owners for accommodation for 15,000 tons, and the erection of a large number of bins for the purpose is contemplated. This gives some idea of the quantity of phosphate that will be shipped from Canada next season.

Phosphate Quotations.

It was stated in the last number of the REVIEW that those who could afford to hold over their summer's output would unquestionably realize better prices for next season's delivery, and the correctness of the statement has been fully proved during the month by offers from dealers in England to make contracts for spring delivery at prices well in advance of what has been rendered producers during the past few months. It must be borne in mind, however, that high grade phosphate is what manufacturers look for, and shippers of inferior quality need not expect to find ready sale at current prices. The latest quotations received for im-

mediate delivery on dock at Liverpool, London and Glasgow, are 1s. 2d. to 1s. 3d. per unit for 80 per cent. guaranteed.

Freight to Montreal.

It is gratifying to learn that the Canadian Pacific Railway Company are likely to reduce the rate of freight on phosphate, responsive to a petition by the more important shippers. The reduction anticipated will be about 12½ cents per ton, or about \$1.12½ per ton from Buckingham Station to the Montreal terminals. The railway company are also preparing to construct additional bins for the accommodation of the steadily increasing output of mineral, which looks as though they proposed holding the carrying trade at all hazard; but, as owners of barges are bidding for this patronage, and are prepared to cut prices, the Railway Company will do well to consider the question of rates. In shipping by water much handling is avoided by barges discharging alongside the vessel.

GENERAL MEETING

A special general meeting of the Dominion Phosphate Mining Company will be held at the office of the company in Montreal on the 14th of November, for the purpose of increasing the capital stock. This corporation holds its charter under a special Act of Parliament, passed during the session of 1882, and has for its officers, Henry Earle, Esq., President; A. F. Riddell, Esq., Vice-President; Chas. Kyte, Esq., Secretary-Treasurer; A. J. Hantoon, Esq., Managing Director. The company's property is known as the "North Star," situated in the Township of Portland East, and is one of the most promising locations in the County of Ottawa.

ACCIDENT

On the Riviere du Lievre.

It was only last month that we called attention to a new scow on the Riviere du Lievre that had been constructed by Messrs. Allen & Bothwell, capable of carrying sixty tons of phosphate. On her first trip an accident overtook her in the Little Rapids on the way to Buckingham Landing. While in the narrow channel she struck a rock, staving a hole in her bottom, and, after drifting a short distance, sank in fifteen feet of water, taking with her about fifty tons of phosphate belonging to the Union Phosphate Company. Divers have since been at work endeavouring to raise her, but without success. It has at last been discovered that she lies embedded in clay, and all hope of moving her has been abandoned until the water lowers. That such an accident should have happened is unfortunate, and that it should have been attended by the loss of valuable property is to be much deplored.

A TEST SHAFT.

Not long since a report was current that Mr. Vennor had expressed an intention of sinking a fifty feet shaft on property adjacent to the Emerald Mine, in the Township of Buckingham, with a view to demonstrating a theory that the large body of phosphate exposed by the development of the Emerald Mine extended beyond the boundaries of Mr. Allan's location, and would be found at a calculable distance below the surface. It is to be earnestly hoped that this theory, or "conjectured turn-over of the bedding" as it has been termed, is a correct one, and that the test spoken of will be made without loss of time; but the sinking of a shaft of suitable dimensions does not appear to be absolutely necessary, more especially as it is said to be the intention to sink continuously until the required depth has been reached regardless of any mineral deposit that may be met with that does not appear to be the main body sought. If there exists any serious intention, on the part of owners of property contiguous to the Emerald Mine, to adopt this means of searching for the phosphate bed within the limits of their respective claims, we would suggest that a co-operative movement might be set on foot, and the several properties prospected with a Diamond Drill at a minimum of cost, thus avoiding the expense of shaft sinking. Should this suggestion meet with favour, we will be happy to provide owners with estimates of the probable cost attending this effectual method of prospecting.

TREATING LOW GRADE PHOSPHATE.

Since the publication, in the September number of the REVIEW, of an article on this subject, we have had an opportunity of personally visiting many of the phosphate mines, and were much impressed with the vast amount of low grade ore that is lying at the mouths of the pits, and at the seemingly large quantity of mineral mixed with the rock in the dumps, all of which is cast aside as unmarketable in the absence of suitable machinery to separate them. We have recently been favoured with a detailed explanation of the *modus operandi* by which the separation may be accomplished, and the low grades converted into merchantable condition, and, unless some grave miscalculation has been made, the machinery which is to do the work appears to be well adapted for the purpose. That this proposed new industry would be of great benefit to the district, it is admitted on all sides, and even those who are most skep-

tical as to its feasibility are open to conviction. That the ore can be successfully manipulated it will shortly be practically demonstrated, after which a company will be formed with sufficient capital to carry on operations on a large scale. Much of the stock has already been applied for.

NAVIGATION OF THE RIVIERE DU LIEVRE.

About three years ago this important question received attention from the Department of Railways and Canals, and some work, of an experimental nature, was done at the Little Rapids with a view to deepening the channel and rendering that part of the river navigable. A considerable quantity of rock was removed from the river-bed and, to a certain extent, the work done proved efficacious, but the traffic, in connection with the mining interest contiguous to the river, increased to such an extent the following season that improvements of a more permanent character became necessary, and it was resolved to petition the Government to cause a lock to be constructed at the point above referred to, that would answer the double purpose of raising the water sufficiently at the Long Rapids and of making the Little Rapids navigable, without regard to high or low water, for any vessel suitable to the requirements of the ordinary traffic of the river. The petition was favourably received and an appropriation of \$10,000 made for the purpose of the immediate carrying out of the proposed improvements, but, through the intermeddling of an individual, or individuals, it was subsequently represented to the Minister of Railways and Canals that the expenditure of the appropriation, for the purpose for which it had been voted, was unnecessary, and that the small amount of work that had been done was sufficient to render navigation on the river practicable and safe. The intention of constructing the lock was, therefore, abandoned, and all the property owners and miners in the vicinity of the Riviere du Lievre have been allowed to suffer in order that the selfish object of an individual might be attained. The first casualty that has been recorded, on account of the absence of the improvements asked for, occurred but a few days ago, when an attempt was made, for the first time, to run the rapids with a barge laden with fifty tons of phosphate; it resulted in the craft going to the bottom with her valuable cargo, particulars of which will be found in another column, and may be the means of convincing its owners that the construction of a lock at this point is not altogether unnecessary. We trust it will be followed by a movement to revive the cry for the speedy execution of the much needed improvements.

GRAPHITE.

For years Ceylon supplied the world with plumbago; the celebrated Cumberland Mine in England is well nigh exhausted, after having been worked for over a century; the United States have of late years taken fair rank in its production, but it is in Canada that deposits of plumbago exist, the richness and purity of which, and freeness from lime—an impediment detrimental to the manufacture of good crucibles—if properly developed, would place Canada, if not in advance of Ceylon, at least before all other countries of the world now producing this mineral. Its abundant existence in the County of Ottawa and throughout eastern Ontario is conclusively established. In Ottawa County it occurs in three distinct forms, viz: as disseminated scales or plates; as lenticular or disseminated masses imbedded in limestone, and as fissure veins cutting the enclosing strata. The plumbago deposits in this district must sooner or later become known the world over for their vastness and for the superior quality of the mineral, as they offer strong inducements for the investment of capital, with every prospect of fortune.

To illustrate the important position Canada might occupy among the plumbago producing countries of the world, and that the superiority of her mineral is recognized outside of the Dominion, we publish the following article on graphite which appeared in the *New York Engineering and Mining Journal* over the signature of Mr. John A. Walker.

"As a mineral, graphite is widely distributed in the United States; as an ore it is found in but few places in sufficient quantities and purity to be profitably worked. It is found in the older rocks of the Appalachian chain from Alabama to Canada. Several discoveries of it have been reported from Michigan. Mr. F. F. Chisholm reports its occurrence in "great purity in five different localities in Albany County, Wyoming Territory, in veins from 18 inches to five feet thick. In Colorado, it is found in different parts of the State. At Pitkin, in Gunnison County, it occurs in beds two feet thick, but very impure. In New Mexico, pure graphite is found in small quantities in the Coal Measures, where it is probably the result of metamorphism. Graphite occurs sparingly in the Black Hills of Dakota." It has been mined at the Senora Mine, Tuolumne County, California.

Of the eastern deposits, those of Pennsylvania, New Jersey, New York, and Canada are of the crystalline or foliated variety, are the best known, and are the only ones which are at present worked. The deposits occurring in Alabama, North Carolina and Virginia are of the amorphous variety. These are of such a nature that purification is economically impossible. They can be used only in the crude state and for but few purposes. The western deposits are still undeveloped.

Origin and Characteristics.—Graphite is now generally conceded to be of organic origin—the result of the metamorphism of some of the products of destructive distillation of vegetable tissue. It occurs in veins, beds, and disseminated through strata (graphitic schists). The veins occur principally in New York, Canada, and the far West. They are true fissures in gneissoid rock. The vein graphite is usually associated with calcite and quartz. Pyroxene, mica, and apatite are sometimes found with it. Crystals of calcite are found which, on being split, show scales of foliated graphite along the planes of cleavage. Graphitic schists are found in the same regions as the veins, and also in New Jersey and Pennsylvania. These are metamorphosed sandstones with foliated graphite very evenly disseminated throughout in small flakes. The graphite found in beds is amorphous, and occurs principally in the south. It is in a sedimentary formation, is quite impure, and on account of its fineness cannot be successfully purified. Geologically, graphite occurs from the Coal Measures back to the oldest rocks.

Productive Localities.—The only place in the United States where graphite is now mined successfully is at Ticonderoga, New York. This property, owned originally by the American Graphite Company, now belongs to the Joseph Dixon Crucible Company, of Jersey City, New Jersey. The American Graphite Company worked the vein deposits to a depth of 600 feet. The Dixon Company now mines a graphite schist 15 feet thick, carrying from 8 to 15 per cent. of graphite, practically an inexhaustible supply.

Numerous attempts have been made to work the similar deposits of Pennsylvania and New Jersey, with only partial success. The parties interested in these attempts are: The Pennsylvania Plumbago Company, the Eagle Plumbago Company, and the Phoenix Plumbago Company, all of which have worked deposits in the Pickering Valley, Pennsylvania; the American Chemical Manufacturing and Mining Company, of Rochester, New York, which has worked the deposits of Northern New Jersey; and Mr. A. Z. Ryerson, who in 1882 worked the deposit at Bloomingdale, New Jersey. Mines of merit are known in Georgia and California, but these cannot now be worked on account of the expensive transportation.

Ore Dressing.—Several methods (both wet and dry) of dressing the ore have been attempted. The process used by the Dixon Company, at

Ticonderoga, owes its success to careful supervision. It is a wet process in which the ordinary practice is reversed, the "tails" being the useful product, while the "heads" are thrown away. All attempts at dry concentration have failed.

Production.—In 1882, the output of the Ticonderoga mine was 400,000 pounds. The output from the other mines have been so spasmodic that it is impossible to give them accurately. Probably 25,000 pounds would cover them all, making a total output in 1882 of 425,000 pounds. For 1883, the Dixon Company have arranged to produce 500,000 pounds; and again estimating the product of the others at 25,000 pounds, we have for 1883 a total output of 525,000 pounds. The average spot value may be stated at eight cents per pound.

Kinds.—On account of the peculiar advertising it has had, graphite is commercially known as German black-lead, Ceylon plumbago, and American graphite. German black-lead is a product of Bavaria. It is of the amorphous variety, and is dressed chiefly by washing. Its price depends on its percentage of graphite and the nature of its impurities, varying from \$1 to \$10 per hundredweight in cargo lots. It is used in the manufacture of pencils, stove-polish and foundry facings. Ceylon plumbago is mined at Travancore, Ceylon, and is shipped from Colombo to all parts of the world. It occurs in immense veins of great purity. Cobbing and sizing are the only preliminary operations it undergoes. It appears in the market graded according to size, as large lump, small lump, chip, and dust. Its price varies from \$2 for dust to \$10 per hundredweight for prime lump, in cargo lots. It is used for all the purposes of the trade, except the manufacture of pencil leads. American graphite, from the nature of its occurrence, appears in the market only in the dressed condition. Its price ranges from \$2 to \$10 per hundredweight wholesale according to purity and fineness. Fineness exercises considerable influence on the price of graphite, on account of the difficulty of pulverizing it. American graphite is used for all purposes of the trade, and excels all kind as a lubricant. It is the same geologically, etc., as the Canadian. Before the development of the American and Canadian mines, the Ceylon miners was the standard.

Analyses.—In 1876, the Canadian government authorized an extensive survey and investigation of the comparative merits of the Ceylon and Canadian varieties. The following table of analyses of carefully prepared samples is from the report of the survey:

ANALYSES OF CANADIAN AND CEYLON GRAPHITES.

LOCALITY.	Specific gravity.	Volatile matter.	Carbon.	Ash.
		Per cent.	Per cent.	Per cent.
Canada, Buckingham; vein graphite; variety, foliated.	2-2689	0-178	99-675	0-14
Canada, Buckingham; vein graphite; variety, columnar.	2-2679	0-594	97-626	1-71
Canada, Grenville; vein graphite; variety, foliated.	2-2714	0-109	99-815	0-0
Canada, Grenville; vein graphite; variety, columnar.	2-2659	0-108	99-757	0-1
Ceylon; vein graphite; variety, columnar.	2-2671	0-158	99-792	0-0
Ceylon; vein graphite; variety, foliated.	2-2664	0-108	99-678	0-2
Ceylon; vein graphite; variety, columnar.	2-2546	0-900	98-817	0-2
Ceylon; vein graphite; variety, foliated.	2-2484	0-301	99-284	0-4

These analyses prove the oft-repeated claim of the dealers in Canadian and American graphite that it is equal to the best Ceylon.

Manufactures.—The properties of graphite make it useful for following general purposes: The manufacture of refractory articles, lubricants, electrical supplies, pigments, and pencil leads. A detailed table of the articles made from it is annexed, with an estimate of the per cent. used for each purpose:

PROPORTIONATE AMOUNTS OF GRAPHITE USED FOR DIFFERENT PURPOSES.

MANUFACTURES.	Kinds of graphite used.	Per
Crucible and refractory articles, as stoppers and nozzles, crucibles, etc.	Ceylon, American.	
Stove-polish.	Ceylon, American, German.	
Lubricating graphite.	American, Ceylon.	
Foundry facings, etc.	Ceylon, American, German.	
Graphite greases.	American.	
Pencil leads.	American and German.	
Graphite packing.	Ceylon, American.	
Polishing shot and powder.	Ceylon, American.	
Paint.	American.	
Electrotyping.	American, Ceylon.	
Miscellaneous—piano action, photographers' gilders', and hatters' use, electrical supplies, etc.		

The earliest use of graphite was for pencil leads. La Moine cites a document of 1387 ruled with graphite. Its use for this purpose has become so extended that in 1882 over 150,000,000 pencils were made in the world. Previous to 1827, black-lead crucibles were made only in Germany. In that year, the late Joseph Dixon began their manufacture in this country, using graphite from New Hampshire. He afterward saw samples of Ceylon plumbago, and appreciating its value, he secured a shipment from Ceylon in 1829. This was the first importation of Ceylon plumbago into this country; since that time, its use has steadily increased. In the fiscal year 1882, 16,047,100 pounds of plumbago were imported, most of which was from Ceylon; the rest from Germany.

Graphite has long been used as a lubricant. This is one of its most useful applications and one which promises most for the future. Formerly, it was offered to the engineer only in the form of a dry powder; now it is compounded, or mixed with fats and oils in many ways, some of which are patented. This use of graphite is attracting the attention of all interested in the problem of the reduction of friction, and promises to outstrip all others. The barriers which have prevented its extensive use in this direction have been the price and the difficulty of securing purity and freedom from all grit. These are now both overcome, the price being now less than 25 per cent. of what it was fifteen years ago. The purity which now is absolute, was then only approximate. For all heavy work, graphite is undoubtedly the lubricant of the future.

The growth of the graphite industry has kept pace with the age, each new development in metallurgy and engineering offering some new field of usefulness for graphite. For instance, it furnishes the pots for the manufacture of cast-steel, and the nozzles and stoppers used in the Bessemer process. It is used in the manufacture of electrical supplies, etc. Fifty years ago, graphite was little known and misnamed. Now, it is of constantly increasing importance. From an insignificant beginning in the present century, the industry has grown to its present proportions."

MINING NOTES.

The Chili Gold Mine, of Venezuela, owned by an English company, sent to London, between the 1st of January and the 28th of June, gold bullion to the value of \$228,000. At this rate the property will give about \$456,000 during 1883.

It is stated that the Cumberland Coal and R.R. Co., N.S., will, by next year, be able, by means of increased facilities, to raise 1,500 tons of coal per day. It now supplies, it appears, 8,000 tons per month to the Inter-colonial Road. Some 700 men are employed by the Company in the mines and on the railway.

A new silver mine has been opened near Little Placentia, Newfoundland, under the management of Mr. F. Ellershausen, who purchased the claim from the discoverers for £4,500 sterling. Some of the richest specimens yielded, on analysis, 300 ounces of silver to the ton. It is considered a most promising mine. A large number of men are employed in working it.

British Columbians are not wanting in enterprise, as has been shown recently by the action of Messrs. Livesley & Co., Contractors, for sinking a shaft for the Vancouver Coal Company, who increased the wages of the workmen twenty-five per cent., as an incentive to them to drive the shaft as rapidly as possible to coal level. This was done with a view to getting a cargo shipped to San Francisco before Christmas.

Gold mining on the Chaudière River, Beauce County, Province of Quebec, is reported as having been

fairly prosperous this season, and preparations have been made for extensive operations next year. There is now a sanguine individual busily at work sinking a deep shaft in full reliance upon its indications. If he succeeds in striking pay-ground he will be paid a fixed sum by the owners of the property. If he fails he will lose his time and expenses.

The Roberts' Iron Company have shut down for the present at their mine in Frontenac County, having raised all the ore that was in sight in the main drift. During the summer the company thoroughly prospected their property with a Diamond Drill and, we understand, succeeded in striking promising deposits in new ground which will probably be opened up within a short time. We will be glad to hear that the company have resumed work on as large a scale as formerly, and will look with interest for reports of progress.

THE WINNIPEG CONSOLIDATED GOLD MINING COMPANY, at the Lake of the Woods, were reported last month to be drifting at the fifty and one hundred feet levels. From the former they were drifting westward in rich ore about three feet in width. On the one hundred feet level they were driving eastward in an ore body, about six feet in width, heavily mineralized. Stopping in the west drift has been commenced with the intention of continuing through to the fifty feet level, in order to have better circulation; the ore thus mined will keep the stamp-mill going.

The Nova Scotia Gold Mines are

reported to be yielding fair profits now-a-days. The "Gallagher," the "Empress," the "Pactolus," the "Oxford" and the "Salmon River" Mines are said to be in a fair industrial condition. Of the two last named, the Oxford is paying handsome dividends, if report be true, and the Salmon River Mines are bringing in a large revenue to the present holders. It is, however, not improbable that a movement will be on foot shortly to dispossess those who are now operating the location, there being a dispute as to the proprietorship, in which the Local Government is mixed up, and serious complications are anticipated.

THE OXFORD GOLD MINING COMPANY, N.S.—This pushing and enterprising association has just opened upon its property near Lake Catcha, Chezetepok, a new lode which promises to eclipse the famous "Mill Lode" which the company has been mining very successfully for some time. When the "Mill Lode" was first opened, some eighteen months since, we predicted a brilliant future for it. The subsequent working of it, as shown by the regular dividends declared by the company, proves the correctness of our judgment. The new find above referred to is about 60 feet north of the "Mill Lode." It has been measured for a distance of fifty feet along the lode, and presents to view a vein of quartz from one to two feet in width. In wealth of gold it probably surpasses anything uncovered in this Province for many years. The gold is free—both coarse and fine, and it permeates the rock so thoroughly and uniformly that we cannot but conclude that it will prove to be a real "Bonanza."—*New Era*.

HAYCOCK IRON MINE.

That work on this valuable property will be resumed has become an assured fact, and the news will doubtless be received with gratification, not only by those directly interested, but by the Ottawa people in general. The new company, which is composed of English capitalists, have expressed their intention to work the mine on an extensive scale, though in a systematic and husbandly manner. Suitable furnaces will be constructed and extensive rolling mills, for the manufacturing of steel rails, will be erected. Skilled labour and the most modern machinery will be employed in all the branches of the company's business, and an enterprise such as this promises to become, supported as it will be by capital, almost unlimited and, having such unusual natural advantages, cannot fail to prosper, and the section of the country in which it will be established must of necessity derive immeasurable benefits. The managing director has been for some time, and still is, in Canada, and gives

every assurance that the day is not far distant when the vicinity of the Gatineau will become the scene of unprecedented activity, and the sound of drill and the report of explosives will be again heard at the Haycock Iron Mine.

Dr. SELWYN'S RETURN.

What He has to Say about Our Western Coal Mines and the Lake of the Woods Gold Regions.

(From the Winnipeg Times.)

Dr. Selwyn, of the Dominion Geological Survey, arrived in the city last evening. He was interviewed this morning by a *Times* representative as to the result of his travels. The gentleman refused, however, to say anything regarding his researches in the Rocky Mountains until his report had been sent in to the Government. As regards the deposits of coal at Medicine Hat and Calgary, he said:—

"The Medicine Hat coal exceeded my expectations, and I consider it a splendid bituminous coal, and the quantity will be sufficient to supply the North-West for ages to come. The coal in Mr. Anderson's cascade mine is a magnificent sample of anthracite, and can be easily mined."

"What about the statement which has been published to the effect that there is no coal deposit near Brandon?"

"I am satisfied that there is no coal in that vicinity."

"Are there any deposits of iron there?"

"There are certainly traces of mineral, but it can never be mined in paying quantities."

"There is a feeling abroad that you are prejudiced against the Lake of the Woods country as a mining region?"

"I am not prejudiced against anything, but would prefer not to give my opinion on that district. Regions with a similar rock formation have, however, been proved not to possess minerals in paying quantities."

The doctor did not wish to say anything regarding his future movements, as they would not be decided on until his report had been submitted.

Manitoba and the North-West Territories.

Many applications have been received at the Department of the Interior in Ottawa for mineral locations in the North-West Territories, chiefly in the Bow River District, and additional applications come in almost daily. Gold, silver and coal have been prospected more assiduously than any other minerals, and the claims already located are said to be very rich. The areas allowed are limited to twenty acres each, but no grants have yet been

made, although it was provided for, by Act of Parliament last session, that, until the Mining Regulations for Manitoba and the North-West Territories should come into force, regulations to govern the disposal of mineral lands in the North-West might be made by Order in Council. In the meantime all applications, which have been made in conformity with the proposed regulations, remain on file in the Department at Ottawa awaiting the action of the Government.

BRITISH COLUMBIA.

CARIBOO.

News from All the Creeks.

There was an exceedingly dry summer, the driest since 1868. Principal mining is hydraulic. The absence of water has prevented the claims from running off much ground and almost entirely stopped them from cleaning up the bed rock.

On Antler Creek the disastrous fire that occurred, coupled with the absence of water, has almost stopped mining operations until the damage can be repaired and the fall rains give water. There are about 30 Chinese companies working on the lower end of Antler taking out a great deal of gold.

The Waverly Company, on Crouse Creek, whose operations had been entirely suspended for the lack of water, have begun piping again. Among the claims that have done fairly well this season may be mentioned the Simms & Jarvis Brown, Stevenson & Reid, Larry & Bunden Co's. The Jenny Lind Co. having acquired the first right to the water at the upper end of William Creek, have begun to clean up. They have some good ground which is expected to pay well.

The old Barker Co. are preparing to work and with good reason for thinking they will be on pay all winter.

On Jack of Clubs Creek the Two Sisters Co., the controlling interest in which is held by Messrs. Mason and Daly, have succeeded in draining their upper diggings, and will begin taking out gold immediately. This company will be able to work all winter, as will also the Discovery Company, whose claim adjoins the Two Sisters at the upper end.

On the Mosquito Creek the Discovery claim, owned by the Flynn Bros., has done well for the season. The Alabama Company took out their first gold this year after five years' work in running a cut to open their mine and in bringing water on it. They have a splendid bank of gravel and the prospects obtained, during the time that they were able to pipe, promise a rich harvest for their pluck and energy. It has

been an exceedingly heavy piece of work to open the claim, and reflects the greatest credit on the shareholders. Butts & Co. are also doing good work and taking out gold.

The Sugar Creek Hydraulic Co's. claim also promises well for the future if getting considerable gold may be considered a fair indication.

The Black Bull claim on Lowhee has also been paying well all summer. At least one half of the gross product is in the hands of the heathen, who are slowly absorbing much good mining ground without any beneficial result either to the province or the people.

The Burns Mountain Company are pushing their tunnel ahead vigorously. The prospects obtained in the ledge are very encouraging. — *British Colonist.*

MISCELLANEOUS.

The steamer *Gallia*, of the Cunard Steamship Company, which sailed from Liverpool for New York on the 27th of October, had on board a half million in gold.

It was reported during the month that prospectors were following up indications of galena in Ottawa County, and that they were hopeful of discovering valuable deposits. We will be glad to hear that they have realized their expectations.

Messrs. Adams & DeCamp have purchased the property east and adjoining the Oxford Gold Mining Company's property, at Lake Catcha District, East Chezetcook, N.S., for the sum, it is reported, of twenty thousand dollars.

The reported value of the diamonds from the African fields, sent chiefly from the Cape of Good Hope by mail, since the 1st of June 1876, to the close of 1882, as officially estimated, has been about \$102,047,924.

It is stated that English capitalists are seriously contemplating investing in gold mining properties in the Lake of the Woods district, and will shortly dispatch experts across the ocean for the purpose of examining and reporting on several valuable locations which have been selected.

Eight railroads, with a capital stock aggregating \$84,934,300, declared dividends, payable in October in Boston, amounting to \$913,414. A single mining company, the Calumet & Hecla, will pay a quarterly dividend of \$500,000 in November, in the same city. — *N. Y. Mining Record.*

At the office of the REVIEW may be seen specimens of white marble from the Ottawa district that are equal in the closeness of the grain to any Italian marble that has been

imported to this country. It takes a beautiful polish and is said to lie in beds that are capable of producing blocks of almost any dimension.

Specimens from recently discovered plumbago deposits have reached us, and the ore appears to be equal in point of richness to anything yet reported on. The deposits, which exist on the Upper Ottawa, are said to be capable of producing an unlimited supply of high grade ore, in fact, if report be true, they should be practically inexhaustible.

IRON WATCHES.—Messrs. Crowther Bros. & Co., of Kidderminster, in order to prove the malleability and ductility of their iron, have constructed a watch entirely of that metal, which keeps excellent time. Claudius Saunier, in reporting this fact in the *Révue Chronométrique*, adds: "There is nothing new under the sun. We have a watch upon which is engraved the date of 1504, and in which all the wheels and pinions are made of iron."

Search for mica is unabated, and the discovery of deposits of some extent are reported. The quality of the mica, if we may judge from samples forwarded to this office, is superior to any that has been met with in Canada heretofore, but the quantity is problematical and will not be known until some development work has been done. The most promising deposits are in localities contiguous to the Ottawa River, and one in the County of Hastings is said to be valuable.

DIVIDENDS.

THE CALUMET AND HECLA COPPER MINING COMPANY, of Michigan, has declared its regular quarterly dividend of \$5 per share, aggregating \$500,000, making the total amount paid to date \$24,350,000.

THE OSCEOLA CONSOLIDATED COPPER MINING COMPANY, of Michigan, has paid another dividend of 50 cents a share, or \$25,000, making a total of \$150,000 in dividends paid this year.

THE SIERRA GRANDE MINING COMPANY, of New Mexico, has paid \$500,000 in dividends this year; the last being 25 cents per share, aggregating \$100,000 was paid on the 3rd of October.

THE PLYMOUTH CONSOLIDATED MINING COMPANY, of California, have paid during the month their fifth consecutive monthly dividend of 50 cents a share, aggregating \$50,000. Total of dividends this year \$250,000.

THE COPPER QUEEN MINING COMPANY, of Arizona, declared their regular quarterly dividend of 50

cents a share, or \$125,000, payable on the 16th of October, making a total of \$500,000 paid this year.

THE HOMESTAKE MINING COMPANY, of Dakota, should have paid during October their sixty-third successive monthly dividend of 20 cents a share, aggregating \$25,000. Total of dividends this year \$175,000.

PICTURESQUE CANADA.

A gentleman, identified with Canadian mining industries, was in Ottawa recently and gave a most graphic description of the scenery at the western end of the eastern division of the Canadian Pacific Railway. He had occasion to spend a short time at Lake Nipissing and was perfectly enchanted with what he had seen, especially in the immediate vicinity of North Bay, where there is a magnificent sand beach, and from which point the view of the Lake, studded with innumerable islands, surpasses, in scenic grandeur, anything he has met with on this continent, and he predicts that, ere long, North Bay will be known as the Canadian Saratoga.

McIntyre & Lewis, BARRISTERS, SOLICITORS & NOTARIES PUBLIC.

Conveyancing of Properties and Mineral Rights.

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(adjoining Canadian Mining Review Office.)
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NOTICE

AS A NUMBER OF SETTLERS WERE unable for one cause or another to avail themselves of the offer made by the Department to grant a reduction of 25 per cent. on all arrears of interest paid up to the 25th of June, it has been decided to extend the time during which this extension will be granted, up to and including the 31st December next, to all settlers who pay to the agents the sums due by them.

After that date legal proceedings will have to be taken against all those who have not then paid.

W. W. LYNCH,
C.C.L.

Department of Crown Lands,
Quebec, August 24th, 1883.



NOTICE TO CONTRACTORS.

SEALED TENDERS, addressed to the undersigned, and endorsed "Tender for Collingwood Works," will be received until Friday, the 16th day of November next, inclusively, for the construction of a further length of Breakwater at Collingwood, Ontario, according to a plan and specification to be seen on application to Adam Dudgeon, Esq., Mayor, from whom printed forms of tender can be obtained.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque, made payable to the order of the Honourable the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party decline to enter into a contract when called upon to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

By order,
F. H. ENNIS,
Secretary.

Department of Public Works,
Ottawa, 22nd Oct., 1883.



NOTICE TO CONTRACTORS

SEALED TENDERS addressed to the undersigned, and endorsed "Tender for Cheverie Works," will be received until Friday, the 16th day of November next, inclusively, for the construction of a Breakwater at Cheverie, Hants County, N.S., according to a plan and specification to be seen on application to John G. Burgess, Esquire, Cheverie, from whom printed forms of tender can be obtained.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque, made payable to the order of the Honourable the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party decline to enter into a contract when called upon to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

By order,
F. H. ENNIS,
Secretary.

Department of Public Works,
Ottawa, 22nd Oct., 1883.

PHOSPHATE PROPERTY
For Sale in North Burgess.

Mining Rights of $W\frac{1}{2}$ of 13, in the 5th range. About 100 tons of very high grade Phosphate have been shipped from this property. Will be sold to an immediate purchaser for \$750. Apply at the office of the MINING REVIEW.



ST. LAWRENCE CANALS.

Notice to Contractors.

SEALED TENDERS, addressed to the undersigned and endorsed "Tender for St. Lawrence Canals," will be received at this office until the arrival of the eastern and western mails on TUESDAY, the 13th day of NOVEMBER next, for the construction of a lock and regulating weir and the deepening and enlargement of the upper entrance of the Cornwall Canal.

Also for the construction of a lock, together with enlargement and deepening of the upper entrance of the Rapide Plat Canal, or middle division of the Williamsburg Canals.

Tenders will also be received until TUESDAY, the 27th day of NOVEMBER next, for the extension of the pierwork and deepening, etc. of the channel at the upper entrance of the Galops Canal.

A map of the head or upper entrance of the Cornwall Canal and the upper entrance of the Rapide Plat Canal, together with plans and specifications of the respective works, can be seen at this office, and at the Resident Engineer's Office, Dickenson's Landing, on and after TUESDAY, the 30th day of OCTOBER next, where printed forms of tender can be obtained.

A map, plans and specification of the works to be done at the head of the Galops Canal can be seen at this office and at the lock-keeper's house, near the place, on and after TUESDAY, the 13th day of NOVEMBER next, where printed forms of tender can be obtained.

Contractors are requested to bear in mind that tenders will not be considered unless made strictly in accordance with the printed forms, and—in the case of firms—except there are attached the actual signatures, the nature of the occupation and residence of each member of the same; and further an accepted bank cheque for the sum of Two Thousand Dollars must accompany the tender, which sum shall be forfeited if the party tendering declines entering into contract for the works at the rates and on the terms stated in the offer submitted.

The cheque thus sent in will be returned to the respective parties whose tenders are not accepted.

This Department does not, however, bind itself to accept the lowest or any tender.

By order,
A. P. BRADLEY,
Secretary.

Department of Railways and Canals,
Ottawa, 28th Sept., 1883.



NOTICE TO CONTRACTORS.

SEALED TENDERS addressed to the undersigned, and endorsed "Tender for Examining Warehouse, Montreal," will be received at this office until WEDNESDAY, the 31st instant, inclusively, for

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Plans and specifications can be seen at the Office of J. Nelson, Esq., Architect, Montreal, and at the Department of Public Works, Ottawa, on and after MONDAY, the 22nd instant.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque, made payable to the order of the Hon. the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party decline to enter into a contract when called upon to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

By order,
F. H. ENNIS,
Secretary.

Department of Public Works,
Ottawa, 15th Oct., 1883.

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S $\frac{1}{2}$ " 2, " 11th "			
S $\frac{1}{2}$ " 12, " 11th "			
S $\frac{1}{2}$ " 13, " 11th "			
Lot " 1, " 12th "			

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PRIVATE BILLS.

PARTIES intending to make application to the Legislature of the Province of Quebec for Private or Local Bills, either for granting exclusive privileges or conferring corporate powers for commercial or other purposes of profit, for regulating surveys or boundaries, or for doing anything tending to affect the rights or property of other parties, are hereby notified that they are required by the Rules of the Legislative Council and the Legislative Assembly respectively (which are published in the Quebec Official Gazette), to give ONE MONTH'S NOTICE of the application (clearly and distinctly specifying its nature and object), in the Quebec Official Gazette, in the French and English languages, and also in a French and English newspaper published in the District affected, and to comply with the requirements therein mentioned, sending copies of the first and last of such notice to the Private Bills Office of each House, and any persons who shall make application shall within one week from the first publication of such notice in the Official Gazette forward a copy of his Bill, with the sum of one hundred dollars, to the Clerk of the Committee on Private Bills.

All petitions for PRIVATE BILLS must be presented within the "first two weeks" of the Session.

L. DELORME,
Clerk. Leg. Assembly.

Quebec, 1st October, 1883.

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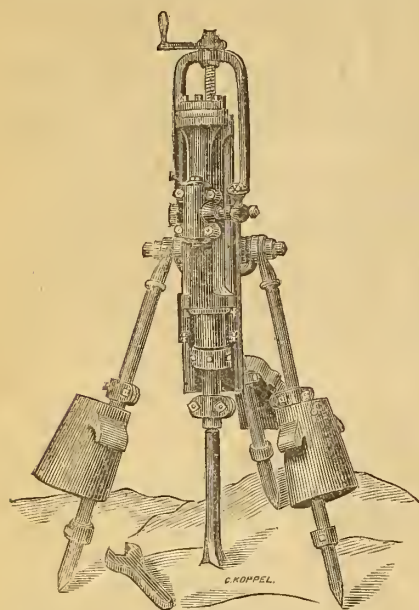
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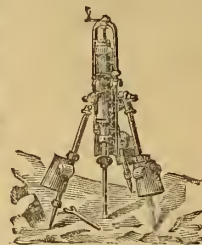
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In the Township of Portland West,
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MINING REVIEW

VOL. 1.—No. 13.

OTTAWA, NOVEMBER, 1883.

VOL. 1.—No. 13

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 UNION CHAMBERS, 14 Metcalfe Street.

The CANADIAN MINING REVIEW is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts as well as others interested in Canadian Mineral Lands are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 20th of the month it is to appear.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

THE office of the Keeper of Mining Records, in England, has been abolished, and the collecting of mine statistics in Great Britain will hereafter be conducted by inspectors under the surveillance of the Home Office.

FROM England and the United States money is coming abundantly to Canada for investment in her mining industries, and this, in addition to a large amount of local capital employed, is bringing about the rapid development of the mines throughout the Dominion. In Nova Scotia the gold mines are, in instances, yielding more

per man employed than are those of any other gold region in the world, and latest reports go to show that the majority of the mines in the Province are being profitably worked. Some of the copper and iron mines are also paying well, though the latter mineral has not yet received attention commensurate with its presence, or the advantages of the fuel, fluxes, and ore beds occurring close together, and her coal fields have, for many years, been a source of great wealth to this Province. Coal is also profitably mined in New Brunswick, but the attempts that have been made to mine iron and copper ores in the Province have been attended with indifferent success.

In that portion of the Province of Quebec, known as the Eastern Townships, copper and asbestos mining has, for some years, been carried on most successfully, and in the County of Beauce alluvial gold mining gives employment to a large number of miners during the summer season. In Ottawa County phosphate mining has developed into an industry of great importance, and, although the plant and machinery required for the working of these mines is simple and inexpensive, capital is flowing in for the purpose of extending operations. The Haycock Iron Mine in the same County will shortly be in full blast under an entirely new management with ample capital to provide every necessary facility for the proper developing of the company's property.

In Eastern and Central Ontario a vast amount of money is invested in gold, iron, phosphate and mica mining, and in the

western portion of the Province, gold, silver, copper and iron mines are being vigorously worked, chiefly with American and English capital, notably the Silver Islet, and the Michipicoten and Lake Superior Native Copper Companies, while in the Lake of the Woods gold mines, and in the Rabbit Mountain and Huronian silver mines, there is more Canadian than foreign capital invested.

In Manitoba and the North West Territories the capital stock of the various mining companies that have been incorporated by Letters Patent, under the Canadian Joint Stock Company's Act, amounts, in the aggregate, to many millions of dollars, and the result of development work on these locations, which are chiefly gold, coal and copper, is anxiously awaited.

In British Columbia the mining industries are attracting much attention, and the mines are, for the most part, yielding profitably, in some instances under most unfavourable circumstances, and Californian and English capitalists are investing largely in the mineral districts of the Province.

From the Atlantic to the Pacific Coasts, throughout the entire breadth of the Dominion, the mineral wealth of Canada is being rapidly opened up, the mining industries are inviting foreign capital for circulation in the country, and are affording employment for innumerable miners, artisans and professional men, and the Dominion and Provincial Governments' annual reports of progress at the mines will be looked for with greater interest after the close of 1883 than at any former period in the history of Canadian mining.

CANADIAN APATITE.

During the past month more than ordinary interest has been centered in the Phosphate Mining industry, and some important transactions have been recorded, notably the sale, to an American Company, of the famous Emerald Mine, in the Township of Buckingham, for \$125,000 cash, particulars of which will be chronicled in another column. Other properties are about to change hands, it is said, and if report be true, within a few weeks an additional half-million of dollars will be employed by incoming operators in the Phosphate Mining industry of the County of Ottawa.

Captain Robert C. Adams, of Montreal, one of the most experienced, and certainly one of the most successful phosphate miners of Canada, has issued a prospectus for a company to be incorporated that will assume the proprietorship of a large tract of phosphate land now owned by him in the mineral belt, and distributed over the Townships of East and West Portland and Templeton.

The Post Mine is said to be bonded to a Glasgow firm and hopes are entertained that a sale will be effected at a fair price.

Other developed properties have recently been examined and reported on by experts employed by intending investors, and, from what is known of some of these mines, there exists little doubt but that terms will be arrived at in some instances. The main object the owners of these valuable properties have in view, in offering them for sale, is the acquiring of capital that will enable them

to develop virgin properties that they own and on which are very promising surface indications. The developed mines that are being taken up by wealthy companies will become more productive in their hands; modern machinery will be introduced and capital will not be wanting for the most advantageous prosecution of mining operations.

The appearance of the mines throughout the country, the influx of capital, the opening up of new properties and the gradual rise in value of the ore in foreign markets are strong indications that the output for shipment next season will be much in excess of what was sent forward during the past summer. Another feature, which promises to popularize Canadian phosphate abroad next year, is the marked improvement in the quality of the mineral now lying at the mines, and of some that has already been forwarded to point of shipment. This year's experience has, no doubt, taught producers that it is greatly to their advantage to devote more attention, than has formerly been their practice, to the careful clobbering of their output, and, if they continue to clean up the mineral to the high state of purity which characterizes that which is now lying at the mines, shippers will have no difficulty in finding ready sale at best prices.

For the declining quotations during the past summer for Canadian apatite abroad, various theories have been advanced, but from what has come to our knowledge, we are of opinion that it has been confined to three distinct causes. The general temporary depression in the fertilizer trade has, of course, had much to do with the fall in value, and, as was stated in the last number of the REVIEW, the unclean condition of the bulk of Canadian phosphate prejudiced buyers against the mineral, while the third cause of sales having been slow, and at comparatively low figures, was the erroneous impression that went abroad as to the amount

of ore that was awaiting shipment, brought about by producers placing their output in the hands of two or three brokers at the same time for sale, who, in turn, offered it in England and Germany. The same lot being thus offered by different middlemen, conveyed the impression that the season's output was considerably in excess of what it actually amounted to, and stimulated the "bears" to action. These two last mentioned causes for the reduction in price can be easily obviated by producers sending their mineral forward in a clean state and employing but one broker to sell their output, and the MINING REVIEW will endeavour hereafter to keep dealers advised, from month to month, of the approximate amount of mineral raised throughout the district. The depression in the phosphate market is quietly passing away, and, although prices are better now than they have been, it is not premature in stating that they will rule still higher before the opening of the shipping season of 1884.

Another matter which should engage the attention of those who are interested in phosphate mining is the establishing of an assay office in Montreal where shippers could obtain analyses of their shipments before forwarding. The necessity for this is being felt more and more each year, and now that the industry has assumed such increased proportions, the combined patronage of the phosphate miners should amply employ a reliable man for this purpose.

Phosphate mining has become a very important industry in the County of Ottawa, and great improvements have been accomplished during the past few years at the mines, but in the handling of the output there exists ample room for reform which owners of properties will do well to bring about.

THE MINES.

THE "JACKSON RAE."—Of this mine little has been said in the REVIEW, as we had not been

put in possession of any facts concerning its condition, its yielding capacity, or its value. We are now indebted to Mr. Mason, the Superintendent, for a comprehensive description of the property that shows it to be justly entitled to a place among the prominent mines of the county. It is situated in the Township of Templeton, W $\frac{1}{2}$ of Lot 9, in the 10th Range, and is equipped with suitable machinery—a steam drill, hoist and ejector, all worked by the same power, are in operation. A tramway has been constructed from the end of the drift to the sorting shed, and work is conducted in a most systematic manner. The quality of the mineral is of a high grade, the past season's shipments having averaged something over 80 per cent. The mine itself is looking well and with the peculiar facilities for carrying on mining operations it should be a profitable property.

THE "POST MINE," adjoining the "Jackson Rae," it is stated, will shortly change hands and has been idle for some time back, pending the arrival from abroad of an expert to examine it in the interest of the intending purchasers.

THE "McLAURIN MINE" is being steadily worked, and other mines in Templeton are employing a fair number of miners. One property, in the 6th Range, has, within the past few days, been leased to two gentlemen of Ottawa and Montreal, who are now engaged in equipping the mine with necessary plant for the winter's operations.

IN PORTLAND WEST the "High Rock" and the "Union Phosphate Mining and Land Company's" Mines are being vigorously worked as heretofore, and are yielding large quantities of mineral. At other mines in this township good work is being done, and in the 10th Range, on Captain Adams' lots, numerous deposits of mineral have been discovered, the result of careful prospecting.

IN PORTLAND EAST the "Dominion Phosphate Company" have, for weeks past, been working in mineral at the North Star Mine, which is developing into one of great value. At other mines in the township, the "Philadelphia," the "McLaren," and the "French Company's," there is the usual activity, and a considerable amount of mineral is being raised.

IN BUCKINGHAM TOWNSHIP the "Emerald" attracts the most attention and sufficient has been said of this property to convey some idea of the extent of its yielding capacity—it is almost unlimited—and it is expected that this mine will become more productive than ever before in the hands of its present owners, who are men of wealth and experience.

IN THE TOWNSHIP OF WAKEFIELD the "Gemmell" is developing satisfactorily and the quality of mineral continues to be of a uniform high standard.

In every direction throughout the County of Ottawa, miners are busy, and it is very satisfactory to receive the favourable reports that have reached us from nearly all the mines where active operations are in progress.

In the December number of the REVIEW we will publish a correct statement of total production in the county for the year, and, as nearly as possible, the individual output of each mine.

Phosphate Quotations.

The most recent intelligence that has reached us in regard to the probable value of Canadian apatite for the coming season is that offers have come from buyers in England and Germany for delivery next summer at 1s. 3d. per unit for guaranteed 80 per cent. mineral.

We are informed that Mr. W. H. Williams, the energetic President and General Manager of the Union Phosphate Mining and Land Company, will shortly sail for England to complete permanent arrangements for the receiving of the annual output of the company's mine.

A NEW COMPANY.

A prospectus is out for the "Adams Phosphate Mining Company" (limited), the objects of which are the acquiring of certain Phosphate areas, now owned by Capt. R. C. Adams, of Montreal to mine, buy, and sell phosphate, and to buy, develop and sell phosphate lands. The capital stock of the company will be \$250,000, divided into 25,000 shares of \$10 par value each. The working capital to be \$50,000, part of which will be held as a reserve for the purchase of other lands, apart from Capt. Adams' locations, which are situated in the Townships of Templeton, and East and West Portland, comprising a total area of about 2,000 acres. These locations are offered to the company for \$50,000 cash, and 40 per cent. of the capital stock; and Capt. Adams, who is

widely known among phosphate shippers and buyers in Canada and abroad, will assume the management of the company's business. His long experience in phosphate mining in Canada should eminently fit him for the position of General Manager, and should render his services in this capacity invaluable to such a company.

ANOTHER CRAFT

FOR THE

RIVIERE DU LIEVRE.

Mr. W. A. Allan of this city, who has acted so prominent a part in the development of Phosphate mining in Canada, has purchased the steam yacht *Rocket* and will place her on the river next summer. She is now lying in the Ottawa River at Buckingham wharf, awaiting good winter roads before being forwarded to the lower landing on the du Lièvre, from which point she will make her first trip up the river on the opening of navigation next summer.

The 60 ton scow which went to the bottom of the Rivière du Lièvre some weeks ago, of which particulars were published in last month's edition of the REVIEW, has since been successfully raised, and the greater portion of the phosphate with which she was laden has been recovered. The scow was in no way injured beyond having sprung a leak, which caused her to sink, and this proves that the builders who designed and constructed her understood their business. The operation of raising this craft was a crucial test of her strength, but she resisted it and came to the surface apparently uninjured.

OTTAWA COLONIZATION RAILWAY.

Since the work of construction was suspended on the Ottawa and Gatineau Valley Railway the engineers have been employed on the survey of the Colonization Railway from Buckingham village northward. Latest advices from their camp report that an excellent location has been staked out as far as the Little Rapids on the Rivière du Lièvre, and that no engineering difficulties have been encountered. The survey will be pushed forward to the High Falls, and when the route has been definitely located it is expected that the construction of the line will be begun, and when completed the road will necessarily become an important factor in the mining industry of the district it is to traverse.

MINES SOLD.

SALE OF THE EMERALD MINE.—During the past few years many valuable phosphate mines in the County of Ottawa have changed hands, sales at fair prices having been made to English, American and

Canadian capitalists, but the most important sale of property in the history of phosphate mining in Canada was concluded on the 9th instant, when Mr. W. A. Allan of this city sold the famous Emerald Mine to a company of American gentlemen, for the sum of \$125,000 cash. Two months prior to the date of the sale, Mr. Allan, who had been owner of but one-half of the property, became sole proprietor on payment, to his co-owner, of \$40,000.

The property is situated in the Township of Buckingham, County of Ottawa, and is universally admitted to be one of great value. Its present owners are more than satisfied with their purchase, and hold the mine at a valuation greatly in excess of the amount paid for it.

The firm of Ledoux & Richettes, of New York, who enjoy the reputation of being mining engineers of the highest standing, were engaged to report on the property, in the interest of the purchasers, and Mr. W. deL. Benedict was promptly dispatched by them to make the necessary examination. Upon his report, which was a most flattering one, the sale was consummated. Mr. Benedict is a mining engineer and expert who has been engaged on several occasions to examine phosphate deposits in Canada, and his reports have shown that he possesses more than ordinary ability and practical knowledge.

Mr. Allan is to be congratulated upon receiving such a handsome sum for his property, and Messrs. Fanclot, Sweet and Paige, representing the purchasers, are to be envied the possession of the Emerald, the most valuable mine yet discovered in Canada.

The phosphate property known as the "Brown Mine," in the 8th Range of Portland West, has been sold within the past few days to English capitalists for \$22,000 cash. Mr. A. G. Cole, of this city, purchased the property not more than a year ago, at a moderate price, and although he has received a handsome advance on his outlay, the purchasers have received fair value for their investment. Mr. Hepworth Brown, a mining engineer, was sent from England to examine and report on the mine, and upon his advising its purchase, negotiations were concluded. One deposit of great extent exists on the property, and many less important ones have been uncovered. About 50 tons of phosphate have been mined, and it is the intention of the present owners to prepare for active mining operations without loss of time.

It is currently rumoured, and with some authority, that Mr. W. A. Allan contemplates purchasing the "Watt Mine" in the Township of Portland East, immediately south of the Little Rapids. This mine was successfully worked by the

Buckingham Mining Company until their suspension, and a large quantity of high grade phosphate was raised. The deepest shaft known to have been sunk at any phosphate mine in Canada is on this property, a depth of 187 feet having been reached, in the bottom of which there is a large body of mineral. Other openings on the lot expose veins of more than ordinary dimensions and a large amount of high grade phosphate is in sight. Mr. Allan has ten men busily engaged in prospecting the ground, and it is more than probable that before this number of the REVIEW issues he will have become the owner of this valuable property.

Since writing the above we have received positive information that Mr. Allan has purchased the "Watt Mine," and will proceed with mining operations during the winter, which will be confined to the development of the deposits near the surface. The deep shafts on the property will not be emptied or worked before next summer.

The Halifax *New Era* records the sale of a gold mine by Messrs. Adams & DeCamp, to the Oxford Gold Mining Company for \$25,000. The property is an extension eastwardly of the Oxford location at Chezzetcook, and was not long since purchased by Messrs. A. & DeC.

ZINC IN CANADA.

Until recently no deposit of zinc of any consequence had been discovered in the Dominion. Many of the metaliferous veins which had been worked, especially those of copper, lead, and silver, contained more or less blende or "black jack," which is the sulphide of the metal. In working the Victoria lead mine, in the neighbourhood of the Sault Ste. Marie, this mineral occurred in considerable proportions. At Blende Lake, near the head of Thunder Bay, fine crystalline bunches of blende are found in a calc spar vein, but the quantity did not prove sufficient to pay for the working of so low priced an ore.

About three years ago the McKeller Brothers, of Fort William, discovered a number of large deposits of zinc blende about ten miles back from Lake Superior on a small stream called the White Sand River, which falls into the north side of the lake a short distance east of Nipigon Bay. At the first meeting of the Royal Society in this city in May 1882, Professor Bell, of the Geological Survey, presented a short paper, accompanied by a map, in regard to this discovery. It appears that the blende here occurs under different conditions from any of the deposits which had been previously known in Canada. Instead of being scattered in a vein, it takes the form of solid crystalline masses, of great size, following the stratification in a hornblende rock. One of

these masses was stated to measure 70 feet in length by about 15 feet in breadth at the middle. A number of smaller masses were exposed at the locality, and another supposed to be the largest of all was found by "costeaning," but its extent was not ascertained. The ore is black and resembles coarsely crystalline magnetic iron. A specimen brought down by Dr. Bell was analysed by Mr. Hoffmann and found to contain 54 per cent. of metallic zinc.

Blende occurs under similar conditions in Scandinavia, and the discovery above referred to shows that new forms of ores of great importance may be found in this country where their existence has not hitherto been expected.

MINING NOTES.

It is stated that at a depth of 680 feet the borings have produced a continuous flow of oil in the wells at Billiveau, Albert County, N.B., also that the oil is remarkably pure.

Development at the Gold Mines near Bridgewater, N.S., has been productive of encouraging results. One lode has increased from 8 inches in width on the surface to 15 inches at a depth of 80 feet, and the quartz is said to carry an unusual quantity of gold.

About twenty tons of anthracite coal has been forwarded to Winnipeg, consigned to the Canadian Pacific Railway Company, to undergo an official test. The seam from which this shipment was taken is situated on Devil's Head Creek, in the Rockies, but the owners will not operate the mine before early in next year.

The bullion shipment from the Oxford, N.S., Gold Mine on the 12th inst. was 197½ ounces. This is the result of crushing 90 tons of ore for the two weeks previous, during which time the mill was one day idle. The greater portion of this shipment was from the company's newly acquired lode, referred to in another column, which is said to be yielding liberally.

A Boston Company has resumed work at the Copper Mines of Dorchester, N.B. The company is giving its attention at present chiefly to the erection of suitable buildings and machinery and it is expected that mining operations will be conducted on a large scale under the supervision of a well known and experienced mining engineer. At present there are about fifty men employed.

The disparaging rumours which have reached us of late concerning the industrial condition of the Coxheath, N.S., Copper Mine are said to be unfounded and we are pleased to be able to report that the prospects at the mine are of a very

encouraging nature. The company is well satisfied with the result of recent development and believes that the mine has increased in value of late in a marked degree.

LAKE OF THE WOODS.

Our advices from this district are up to the 21st inst. The Winnipeg Consolidated Mine had lately procured another small brick of gold of sufficient value to pay working expenses. This mine is now sufficiently developed by the two levels, each of which is driven a considerable distance from both sides of the main shaft, to produce more ore than the present mill could crush, and a new ten-stamp mill was ordered from Messrs. Fraser & Chalmers, of Chicago. This mill is said to have been already shipped and will be teamed to the mine at Big-stone Bay as soon as the ice is strong enough.

The Manitoba Consolidated Mine at Clearwater Bay, is the only other one at which any work is being carried on at present. The Argyle Mine in the same neighbourhood has suspended operations. It is said that, owing to mismanagement, the available funds of the Company have been exhausted without a thorough test of the property having been made.

The Pine Portage Mine is awaiting the arrival of hoisting and ventilating machinery before the sinking of the shaft can be continued with advantage. A considerable pile of rich ore is on hand at this mine.

Owing to various causes, although apart from the merits of the mines themselves, great dullness in connection with this branch of industry is reported from the whole of the Lake of the Woods district.

COAL MINING

IN BRITISH COLUMBIA.

In June of 1881 the Vancouver Coal Company, under the personal supervision of Mr. Jas. Beaumont, mining engineer, commenced the sinking of No. 1 shaft on the Esplanade, near the Indian reserve. The shaft reached the coal about 10 o'clock on Friday night, the 2nd inst., at a distance of 635 feet from the surface. The next morning it was ascertained that the seam was 7 feet 4 inches in thickness, with a slight pitch towards the harbor. The coal is clean and hard and of a very superior quality. This proves a large extent of the company's valuable property, and has inspired confidence in the future of the city of Nanaimo.

The shaft is a round one, 20 feet in diameter, clear of the wooden blocks which line the shaft. The arrangements around the shaft, with the double cages, will enable the company to take out a thousand tons of coal daily.

One very gratifying feature in connection with this work, and one that reflects highly on the skill and carefulness of Mr. Beaumont, is the fact that this immense shaft has been sunk to a depth of 635 feet without inflicting a serious injury on anyone.

Great difficulty has been experienced, owing to the immense amount of water to handle, and the presence of large quantities of sulphur. The latter, at times, almost blinded the men, and compelled the adoption of three hour shifts.

On Monday, the 15th inst., the traditional bullock was roasted whole, and subsequently, by invitation of Mr. Jas. Beaumont, on behalf of the Vancouver Coal Company, the employees of the company, to the number of 250 or more, and several invited guests, sat down to a sumptuous dinner in the Institute Hall.

THE MINERAL RESOURCES

OF THE

NORTH-WEST TERRITORIES.

"Prospect the breadth of Canada on either side of the advancing railway (C.P.R.) but more particularly opposite to Western Dakota, Montana and Idaho, for vein mining, and thence westward for gravel and placer gold, where vast mineral areas lie unexplored!" Such is Mr. Phillips' advice to Canadians and others, given in his letter to the *London Mining Journal* and re-published in the *REVIEW*. That he is sincere in his expressed interest in Canada's future as a mineral producing country there exists no reason to doubt, and that he is correct in his opinions as to the mineral wealth of that portion of the N. W. Territories specially referred to, there is good reason to hope. Having predicted a prosperous future for the country, he now volunteers valuable advice as to how this prosperity can best be attained—encourage and protect the explorer! Such is the advice given us, and, in view of Mr. Phillips' extensive knowledge of mining in the United States, he is competent to point out where the mining laws of his country have been defective, and to offer valuable suggestions to guide the Government of Canada in framing suitable laws for the protection of honest and hardworking explorers. It is with much pleasure, therefore, that we publish the following letter just received, which applies more particularly to locating claims for the precious metals, and we commend it to our readers as worthy of careful perusal:—

Editor CANADIAN MINING REVIEW. PRE-EMPTION OF MINERAL CLAIMS.

Responsive to your desire for a letter from my hand, I select the above immediately important subject, and forward the following thoughts as to the best mode for perfect security in tenure of mineral lands.

In thanking you for the repetition of my recent letter to the *Mining Journal* (of London), on the "Mineral Resources of Canada," I may reiterate the opinion that "there will be very important discoveries made just continuously northward from the Rocky and Wahsatch mountains, extending for a thousand miles across the Dominion of Canada, on the slopes of these mountain ranges, that will surpass anything yet found in your country;" therefore the time and opportunity are convenient for immediate action in framing appropriate common-sense laws, so as to prevent expensive, vexatious and retarding litigations in future mining operations.

Give your brave frontiersmen, prospectors and miners fair play, and foster them by generous and certain privileges!

Make laws that wayfaring men may understand! for equitable majesty and not inglorious legal uncertainty!

We have too many inherent risks in interior mining life; and "legal cap" should be exchanged for percussion, so that the killing of the vicious beast may preserve the man.

The reader may, at his leisure, retrospect the plexiform complications of evidence and questionable decisions of the past, as generated under the too theoretical laws of "following the vein by its sinuosities, angles, dips and spurs; intersections, faults and divisions; by pockets and bonanzas; complicated breaks and uncertainties; of no vein or another's vein; the proof and counter proof; possession or dispossession, by shot guns, shooters and rifles; and suck-like disparagements to the substantial industry of mining.

I would now call your attention to, and define the leading points and features of, a better and safer system by the following few words:

1st. Allow the discoverer of mineral a preliminary right of, say, one thousand feet radius to swing a 2,000 feet circle, for the period of, say, one month from date of his discovery, as claimed by the paper of location, on the spot where the mineral has been found, at the centre of this "discovery circle."

2nd. During this month of protection by 1,000 feet radius, he must examine his vein or deposit as to its bearing, and dip for future development, under the final or permanent rectangular grant of, say, 2,000 feet long by 1,000 feet wide, which he must swing into position and define by corner monuments,

before the month expires, as he may please to direct, provided the first discovery or centre of the "discovery circle" is within its lines. Should he fail to fix his bearings for position during this privileged month, outsiders may then locate and claim in any direction to within 1,000 feet of his first centre.

Extension claims should not necessarily be rectangular; as this would prevent correction for bearings, but opposite sides must be parallel.

3rd. The four monumental columns being thus placed at the corners will bound the surface area, and his mineral rights should be restricted by imaginary vertical planes suspended from corner to corner, at both sides and ends, so that he may take all that lies within but nothing from outside.

In other words, his claim is an inverted rectangular solid pyramid from the surface to the centre of the globe, from which he may extract minerals from any number of veins or deposits therein contained, to any practical depth, within its vertical sides, but nothing from outside of this block of country rock. Thus defined, his right is so clear to all that none may be excused for trespass.

4th. Should any company of miners, during the development of first vein, discover another vein that dips outwardly, before the adjoining side ground has been claimed by others, the first party should be allowed a lateral extension of, say, 500 feet wide for the whole length of their original pre-emption.

5th. Tunnel privileges for the purposes of cross cutting through hills or mountain slopes in speculative search for veins and deposits, ought to be encouraged, and such grants should command at least 1,000 feet on each side of the drift.

6th. Mineral grants should not be allowed to remain idle for unreasonable periods, and a statute should be provided for the ejection of "dogs in the manger."

This positive, unquestionable title will secure all from encroachments, and therefore should be strongly advocated in new countries by every true friend of the miner.

J. S. PHILLIPS,

Author of *The Explorer's, Miner's, & Metallurgist's Companion*.

25 State St., New York.

A WESTERN ELDORADO.

Rich Mineral Discoveries in Idaho
—Gold and Silver in large
Quantities.

There is great excitement throughout Western Montana over rich mineral discoveries in Coeur Dalene Mountains. Prospectors who have returned state that no mines have ever been discovered in the history of the Western States and Territories equal in richness and volume to the

newly discovered fields. The minerals consist of silver, tellure, and free-milling gold. A hundred dollars per man per day is being taken out of the rim rock of gulches, while in the gulches \$25 to \$30 per man per day is panned out. The streams are in the northern part of Idaho, near Eagle City, forty miles from Bozeman on the Northern Pacific Railway. There are now about five hundred people in the camp.

DIVIDENDS.

THE HORN SILVER MINING COMPANY, Utah, have declared a quarterly dividend of 50 cents a share; aggregating \$200,000. Total dividends this year \$1,100,000.

THE UNITED VERDI COPPER MINING COMPANY, of Arizona, paid its first dividend on the 31st Oct., of 12½ cents per share, aggregating \$37,000.

THE HOMESTAKE MINING COMPANY, Dakota, has declared its regular dividend this month of 25 cents per share, aggregating \$25,000. Total dividends this year, \$500,000.

THE ONTARIO SILVER MINING COMPANY, Utah, has resumed its regular dividends, and the 89th, amounting to \$75,000, was to be paid November 10th. Total dividends paid to date, \$5,075,000.

THE STANDARD CONSOLIDATED MINING COMPANY, of California, has declared its monthly dividend of 25 cents per share, payable November 12th. Total dividends to date \$4,325,000.

THE EVENING STAR MINING COMPANY, of Colorado, paid its 56th dividend this month, aggregating \$25,000, making the total of dividends to date, \$1,400,000.

MINERAL RESOURCES

OF THE

UNITED STATES.

Some interesting details are given in a report about to be issued, for 1882, and the first six months of 1883, by Mr. Albert Williams, jun., Chief of Mining Statistics and Technology division, United States Geological Survey, and an abstract from the advance sheets furnishes the totals of the production of the more important mineral substances.

COAL.—The only statistics in which the trade is interested are those relating to the amount of coal which is mined for and reaches the market. There is besides a coal and colliery consumption which is usually disregarded in statistics, and which ranges from 5 to 6½ per cent. on the total shipments. Of what may be called the commercial product, the quantities in 1882 were: Pennsylvania anthracite, 29,109,966 gross tons; bituminous,

brown coal, lignite, and small lots of anthracite mined outside of Pennsylvania, 57,963,038 gross tons: total, 87,083,134 gross tons. The spot value of the commercial product was as follows: anthracite, \$65,520,216; bituminous and other coals, \$72,452,797; total, \$137,973,013. During the first six months of 1883 the output was: Pennsylvania anthracite, 14,010,767 gross tons; bituminous and all other coals, 30,000,000 gross tons: total, 44,001,767 gross tons. The spot value of the commercial product during the first half of 1883 was: Pennsylvania anthracite, \$31,524,226; bituminous and other coals, \$37,500,000; total, \$69,024,226. Including the local consumption, etc., the total product in 1882 may be stated at 92,219,454 gross tons—31,358,264 tons of Pennsylvania anthracite and 60,861,190 gross tons of other coals; and the value at the mines was: Pennsylvania anthracite, \$70,556,094; bituminous coal, etc., \$76,076,487; total, \$146,632,581.

IRON.—The principal iron statistics for 1882 are as follows: Pig iron made, 4,623,323 gross tons; spot value, \$106,336,429. Iron ore mined, 9,000,000 gross tons; spot value \$32,400,000. Domestic iron ore consumed, 8,700,000 gross tons; spot value, \$31,320,000. Imported iron ore consumed, 589,655 gross tons. Total iron ore consumed, 9,289,655 gross tons. Total spot value of all iron and steel in the first stage of manufacture, excluding all duplication, \$171,336,429. Anthracite consumed in all iron and steel works, including furnaces, 3,800,000 gross tons. Bituminous coal consumed in all iron and steel works, including furnaces, 6,600,000 gross tons. Coke consumed in all iron and steel works, including furnaces, 3,350,000 gross tons. Charcoal consumed in all iron and steel works, including furnaces, 107,000,000 bushels. Limestone consumed as flux, 3,850,000 gross tons; spot value, \$2,310,000.

For the first six months of 1883 the totals are as follows: Pig iron made, 3,352,019 gross tons; spot value \$47,040,380. Iron ore mined and consumed, 4,500,000 gross tons; spot value, \$12,375,000. Imported iron ore consumed, 185,000 gross tons. Total iron ore consumed, 4,685,000 gross tons. Total spot value of all iron and steel in the first stage of manufacture, excluding all duplications, \$71,000,000. Anthracite consumed in all iron and steel works, including furnaces, 1,810,000 gross tons. Bituminous coal consumed in all iron and steel works, including furnaces, 3,140,000 gross tons. Coke consumed in all iron and steel works, including furnaces, 1,780,000 gross tons. Charcoal consumed in all iron and steel works, including furnaces, 38,750,000 bushels. Limestone consumed as flux, 1,950,000 gross tons: spot value, \$1,072,500.

GOLD AND SILVER.—The Mint

authorities furnish the following statistics for 1882:—Gold, \$32,500,000; silver, \$46,800,000; total \$79,300,000; or an increase of \$1,600,000 over the output in 1881. For the first six months of 1883 the product is estimated at \$16,250,000 gold, \$23,400,000 silver, and \$39,650,000 total; the rate of production being assumed to be the same as in 1882.

PETROLEUM.—The production of crude petroleum in the oil fields of Pennsylvania and New York in 1882 was 30,053,500 barrels of 42 gallons each, worth, at an average spot value of 78½c. per barrel, \$23,704,698. During the first half of 1883 the yield was 11,291,663 barrels, worth, at an average spot value of \$1.00½ per barrel, \$11,305,778. In addition to the quantity above stated, California produced in 1882 about 70,000 barrels.

COPPER.—The production of copper in 1882 was 91,646,232 lbs., worth, at an average value of 17½c. per pound in New York, \$16,038,091. For the first half of 1883 the production is estimated at 58,000,000 lbs., worth, at an average price in New York of 14½c. per pound, \$8,500,000. The spot value of copper at the point of production is a matter which cannot be stated with any accuracy; nor was any attempt made to ascertain the tons of copper ore mined. In 1882, 3,325,000 lbs. of bluestone, worth \$191,187, were made; and in the first half of 1883 the manufacture of bluestone is estimated at 1,662,500 lbs., worth \$95,593.

LEAD.—In 1882, 132,890 net tons of lead were produced, worth, at an average value of \$95 per net ton on the eastern seaboard, \$12,624,550. For the first half of 1883 the production is estimated at 70,000 net tons, worth, at \$90 per ton, \$6,300,000. In this case, as with copper, it is impossible to state the average spot value of the lead, or the tons of lead ore mined. A very large proportion of the lead ore smelted is argentiferous, and is worked for its silver contents and not for the value of the lead. In the census year ending May 31, 1880, the amount of white lead corroded was reported at 123,477,890 lbs., worth \$8,770,699.

ZINC.—The production of metallic zinc in 1882 was 33,765 net tons, worth, at an average value of 5½c. per pound in New York \$3,646,620. The production during the first six months of 1883 is estimated at 18,000 net tons, worth, at an average value of 4½c. per pound in New York, \$1,665,000. In addition to the spelter and sheet zinc made in this country there is also a large manufacture of zinc oxide made directly from the ore. As in the case of copper and lead it is impossible to fix an average spot value for the product, and the collection of statistics of zinc ore mined has not been attempted. In the census year 1880 the amount of zinc oxide manufactured, including that made

from scrap zinc, was reported at 20,121,761 lbs., worth \$766,337.

QUICKSILVER.—In 1882 the production of quicksilver was 52,732 flasks (of 76½ lbs. each = 4,033,998 lbs.), worth, at an average price in San Francisco of 36½c. per pound, \$1,487,537. During the first six months of 1883 the production was 22,740 flasks (= 1,739,610 lbs.), worth, at an average price of 35½c. per pound, \$613,213. During the year 1882 700,000 lbs. of vermillion were made in the United States, having a total value of \$315,000.

NICKEL.—The production of pure grain nickel in 1882 was 277,034 lbs., worth at \$1.10 per pound, \$304,737. There was also a production of 50 per cent. copper nickel alloy containing 4582 lbs. of nickel, worth \$5,040. The total nickel production was therefore 281,616 lbs., worth \$309,777. The only nickel reduction works in the United States were closed during the first half of 1883.

COBALT.—The value of cobalt ores and matte for 1882 was about \$15,000. The amount of cobalt oxide made was 11,653 lbs., worth \$32,046.

MANGANESE.—The production of manganese ore in 1882 was 3,500 gross tons, and the spot value at the mines, estimated at \$15 per ton, was \$52,500.

CHROMIUM.—The production of chrome iron ore in 1882 was about 2,500 net tons, worth, at an average price of \$40 per ton in Baltimore, \$100,000. The spot value cannot be ascertained.

TIN.—A trifling amount of tin ore was mined in 1882 and the first half of 1883, and production of metallic tin began on a small scale towards the close of the latter period.

ANTIMONY.—The production of metallic antimony, so far as ascertained, was 60 tons in 1882, worth about \$12,000.

BUILDING STONE.—It is estimated that the value of the building stone quarried in 1882 was \$21,000,000.

BRICK AND TILE.—It is estimated that the total value of the brick and tile made in the United States in 1882 was \$34,000,000.

LIME.—There were 31,000,000 barrels (of 200 lbs. each) made in 1882, having a total spot value of \$21,700,000 at the kilns.

CEMENT.—The amount of artificial Portland cement made in 1882 was 85,000 barrels, worth, spot, \$191,250. Of the cement manufactured from natural cement rock there were 3,165,000 barrels made, worth, spot, \$3,481,500. The total production of cement was 3,250,000 barrels, worth \$3,672,750.

PHOSPHATES.—The production of washed phosphate rock in 1882 by the land mining companies of South Carolina was 191,305 gross tons; spot value, \$1,147,830. By the river mining companies, 140,772 gross tons; spot value, \$844,632. Total 332,077 gross tons; spot value, \$3,992,462.

Incorporated Dividend-Paying Mines of the United States.

NAME AND LOCATION.	Latest quotation per share.	Current value of Mine.	Number of Shares.	Par Value.	Capital Stock Dollars.	Last Assessment.		No. of Assessment.	Total Assessment to date	Last Dividend.		Total Dividends to Date.	
						Date.	Amount per Share.			Date of Payment.	Amount per Share.		
Alice G. and S. M. Co., Montana.....	\$2 50	\$1000000	400000	\$25	10000000	not assessable..	.....	.....	.....	Dec. 15, 81.....	10	10	\$400000
Amie Con. Mining Co., Col	13	65000	500000	10	5000000	.....	.....	.....	.....	October 2, 83.....	7	7	330000
Atlantic Copper M. Co., Michigan.....	10 00	400000	40000	25	1000000	April 5, 75.....	.....	.....	180000	Feb. 1, 83.....	4	4	229000
Bassick Mining Co., Colorado	8 50	850000	100000	100	10000000	.....	.....	.....	.....	June 26, 83.....	1 00	3	225000
*Black Bear Quartz Gold M. Co., California.....	.....	.....	30000	100	3000000	.....	.....	.....	15000	May 11, 83.....	20	83	881000
Boston & Montana Gold M. Co., Montana.....	.....	.....	200000	10	2000000	.....	.....	.....	.....	Jan. 10, 83.....	05	17	310000
Bodie Con. Mining Co., California	60	50000	100000	100	10000000	August 4, 83 ..	5	250000	.....	Nov. 15, 82.....	20	21	1370000
Bulwer Con. Mining Co., California	40	40000	100000	100	10000000	December 12, 77	1	30000	.....	July 2, 83.....	05	18	165000
Chrysolited Silver Mining Co., Colorado.....	1 45	290000	200000	50	10000000	not assessable..	.....	.....	.....	Dec. 10, 81	50	11	1600000
Consolidated Gold Mining Co., Georgia.....	.....	.....	100000	5	500000	"	.....	.....	.....	October 10, 83.	02	27	106000
California Gold Mining Co., Gilpin Co., Col.	.....	.....	130000	.....	.....	.....	.....	.....	.....	August 13, 83..	25	2	65000
Calumet & Hecla Copper M. Co., Michigan..	238 00	23800000	100000	25	2500000	.....	15 00	.....	1200000	Nov. 15, 83.....	5 00	.....	24350000
Carbonate Hill Mining Co., Col .....	.....	.....	200000	10	2000000	.....	.....	.....	.....	July 2, 83.....	05	6	60000
Catalpa Mining Co., Leadville, Col	25	75000	300000	10	3000000	not assessable..	.....	.....	.....	June 15, 83.....	10	5	240000
Castle Creek Gold (Placer) M. Co., Idaho.....	1 20	120000	100000	1	100000	.....	.....	.....	.....	Nov. 16, 83.....	04	18	55000
Central Copper M. Co., Michigan	21 50	430000	20000	25	500000	Sept. 10, 61....	65	.....	100000	Feb. 1, 83.....	3 00	21	1670000
Christy Mining Co., Silver Reef, Utah.....	.....	.....	60000	100	6000000	.....	.....	.....	.....	Feb. 9, 83.....	10	15	90000
*Contention Company, Arizona .....	.....	.....	250000	50	12500000	.....	.....	.....	.....	June 28, 83.....	25	18	1062500
Copper Queen Mining Co., Bisbee, Ariz.....	.....	.....	250000	10	2500000	.....	.....	.....	.....	October 16, 83.	50	17	1025000
Crescent Mining Co., Utah .....	.....	.....	600000	.....	.....	.....	.....	.....	.....	October 25, 83.	05	4	100000
Deadwood-Terra Mining Co., Black Hills ..	.....	.....	200000	25	5000000	not assessable..	.....	.....	.....	Jan. 20, 83.....	10	26	\$900000
Dean Mining & Prospecting Co., of Col .....	.....	.....	100000	.....	.....	.....	.....	.....	.....	Dec. 1, 82.....	50	1	5000
Dunkin Mining Co., Col	20	40000	200000	25	5000000	.....	.....	.....	.....	October 2, 83..	16	.....	21021
Evening Star Mining Co., Col .....	.....	.....	50000	10	500000	not assessable..	.....	.....	.....	Nov. 25, 83.....	50	56	140000
Eureka Con. Silver M. Co., Nevada.....	3 75	187500	50000	100	5000000	Sept. 20, 83.....	1 00	6	300000	July 27, 82.....	25	25	481750
Father DeSmet Con. Gold M. Co., Dakota ..	3 50	350000	100000	100	10000000	Nov. 13, 78.....	2	200000	.....	October 30, 83.	20	29	70000
Franklin Copper Mining Co., Mich	11 00	594000	54000	.....	.....	June, 77.....	.....	.....	360000	.....	.....	.....	24000
Grand Central Mining Co., Tombstone, Ariz.	.....	.....	100000	100	1000000	.....	.....	.....	.....	December, 82..	50	16	80000
Great Western Quicksilver M. Co., Cal .....	.....	.....	50000	100	5000000	August 25, 73..	15	.....	35500	October, 82.....	25	.....	26250
Hecla Con. Mining Co., Montana .....	.....	.....	30000	50	1500000	.....	.....	.....	.....	October 1, 83..	50	.....	52250
Homestake Mining Co., Deadwood, Dakota ..	10 00	1250000	125000	100	12500000	April 8, 78.....	2	200000	.....	Nov. 24, 83.....	20	63	221250
Holyoke Mining Co., Idaho .....	.....	.....	200000	.....	.....	.....	.....	.....	.....	Nov. 19, 83.....	02	14	5800
Horn Silver Mining Co., Utah	6 50	2600000	400000	25	10000000	none .....	.....	none.....	.....	Nov. 15, 83.....	50	11	280000
Hope Mining Co., Montana .....	.....	.....	8000	.....	.....	.....	.....	.....	.....	October 2, 83..	1 50	.....	11303
*Idaho Gold M. Co., (Grass Valley) Cal.....	.....	.....	3100	100	310000	.....	.....	.....	.....	Nov. 6, 83.....	1 00	1 73	340220
*Indian Queen Mining Co., Nevada	75	225000	300000	2	600000	Feb. 11, 80.....	15	3	12000	July 2, 83.....	01 1/2	31	37400
Iron Silver Mining Co., Leadville, Col	2 30	1150000	500000	20	10000000	.....	.....	.....	.....	October 5, 83..	20	12	112000
Jocunita Mining Co., Mexico.....	.....	.....	100000	100	10000000	.....	.....	.....	.....	Nov. 30, 83.....	50	10	95000
Kentuck M. Co., Nevada.....	.....	.....	30000	100	3000000	Nov. 23, 81.....	17	342005	.....	Nov. 9, 83.....	10	40	126000
La Plata Mining & Smelting Co., Col .....	.....	.....	200000	10	2000000	not assessable..	.....	.....	.....	October 2, 82 ..	30	35	61000
Leadville Con. Mining Co., Col	45	180000	400000	10	4000000	"	.....	.....	.....	October 15, 83.	05	17	35000
Little Chief Mining Co., Col	55	100000	200000	.....	.....	.....	.....	.....	.....	October 2, 83 ..	10	8	72000
Mt. Diablo M. Co., Nev.....	4 00	200000	50000	.....	.....	.....	.....	.....	.....	November 25, 83	25	4	5000
Mt. Pleasant M. Co., Cal .....	.....	.....	150000	1	150000	.....	.....	.....	.....	Sept. 27, 83.....	.....	3	6000
Morning Star Con. M. Co., Leadville, Col ..	.....	.....	100000	10	1000000	.....	.....	.....	.....	June 28, 83.....	25	17	66500
Napa Con. Quicksilver, M. Co., Cal	2 25	225000	100000	7	700000	not assessable..	.....	.....	.....	November 1, 83	20	30	31000
Navajo Mining Co., Tuscarora, Nevada	4 00	400000	100000	100	10000000	March 7, 82	10	255000	.....	May 14, 83	25	9	22500
*New York Hill Gold Mining Co., Cal.....	.....	.....	50000	100	5000000	March 26, 78.....	20	6	55000	August 10, 82..	10	21	21500
Northern Belle Milling & Mining Co., Nev..	4 00	200000	50000	100	5000000	.....	.....	.....	.....	April 16, 83.....	50	71	251250
*North Bloomfield Gold M. Co., Cal .....	.....	.....	45000	100	4500000	June 23, 81.....	.....	.....	1590000	November 5, 80	1 00	16	22500
Ontario Mining Co., Utah.....	30 00	4500000	150000	100	15000000	.....	.....	.....	None	November 30, 83	50	89	507500
Oseola Con. Copper M. Co., Calumet Dis. Mich	18 00	900000	50000	25	1250000	.....	.....	.....	.....	October 5, 83 ..	55	16	98500
Original Mining Co., Butte, Montana .....	.....	.....	60000	25	1500000	not assessable..	.....	.....	.....	November 5, 83	05	27	810
Oxford Gold Mining Co., Nova Scotia .....	.....	.....	100000	.....	.....	.....	.....	.....	.....	August 25, 83..	.....	6	300
Pleasant Valley Mining Co., Cal .....	.....	.....	100000	100	10000000	Sept. 8, 83.....	15	2	30000	Dec. 15, 82.....	05	6	300
Plumas Eureka Gold Mining Co., Cal	7 63	412000	40625	.....	1406250	.....	.....	.....	.....	October 12, 83.	50	.....	5890
Plymouth Con. M. Co., Cal .....	.....	.....	100000	.....	.....	.....	.....	.....	.....	October 3, 83 ..	50	5	2500
Prussian Mining and Milling Co., Col .....	.....	.....	150000	10	1500000	.....	.....	.....	.....	Jan. 15, 83.....	10	10	1320
Quincy Copper Mining Co., Michigan	50 00	2000000	40000	25	1000000	.....	15 00	.....	200000	August 15, 83..	3 50	30	36100
Richmond Con. Silver M. Co., Nevada.....	30 00	1620000	54000	25	1350000	.....	.....	.....	.....	August 10, 83..	1 25	36	39748
Robinson Con. Mining Co., Leadville, Col ..	39	78000	200000	50	10000000	.....	.....	.....	.....	Nov. 15, 81.....	25	11	7000
San Francisco Copper M. Co., Cal.....	.....	.....	50000	.....	.....	.....	.....	.....	.....	Feb. 20, 83.....	05	11	270
Sierra Buttes Gold M. Co., Cal	6 25	765625	22500	10	225000	paid up .....	.....	.....	.....	October 12, 83.	25	.....	2500
Sierra Grande M. Co., New Mexico	9 1/2	360000	400000	.....	.....	.....	.....	.....	.....	October 2, 83 ..	25	7	7000
Silver King Mining Co., Arizona .....	.....	.....	100000	100	10000000	.....	.....	.....	.....	June 16, 83.....	25	42	12750
Silver King Mining Co., Colorado.....	.....	.....	500000	2	1000000	not assessable..	.....	.....	.....	August 19, 81..	10	1	500
Standard Con. Mining Co., California	6 50	650000	100000	100	10000000	.....	.....	.....	.....	Nov. 12, 83.....	25	76	43250
*Silver Cord Silver M. Co., Colorado .....	.....	.....	500000	10	5000000	.....	.....	.....	.....	Nov. 1, 83.....	10	3	2250
St. Joseph Lead Co., Missouri .....	.....	.....	100000	10	1000000	.....	.....	.....	.....	Dec. 20, 82.....	20	22	3900
Smuggler Con. M. Co., Colorado.....	.....	.....	60000	.....	.....	.....	.....	.....	.....	August, 83.....	20	10	660
Socorro M. & M. Co., New Mexico .....	.....	.....	2500	100	250000	.....	.....	.....	.....	March 15, 82 ..	1	2	40
Tip-Top S.M. Co., Black Canyon, Yavapai Co.	.....	.....	100000	100	10000000	August 16, 83..	25	7	245000	Nov. 27, 81.....	20	5	1000
Tombstone Mill & Mining Co., Arizona.....	75	375000	500000	25	12500000	.....	.....	.....	.....	April 15, 82	10	25	12500
Total Wreck M. Co., Arizona.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	May, 83.....	.....	1	50
United Gregory M. Co., Gilpin Co., Col .....	.....	.....	300000	1	300000	.....	.....	.....	.....	April 1, 83.....	04	3	38
Vizina Con. M. Co., Tombstone Dist. Ariz ..	.....	.....	200000	25	5000000	.....	.....	.....	.....	April 1, 82.....	10	7	140

*Shares not in market. †Latest London quotations. ‡Price bid. §The Deadwood has previously paid \$275,000 in eleven dividends and the Terr \$75,000. Only paid on 450,000 shares. ¶This company as the western up to Dec. 10, 1881, paid \$1,475,000.

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SEALED TENDERS addressed to the undersigned, and endorsed "Tenders for Telegraph Poles," will be received at the Department of Public Works, Ottawa, up to SATURDAY, the 15th day of DECEMBER, next, for the supply of about

1,225 Telegraph Poles more or less,
of the following dimensions, viz., Cedar Poles, barked, 25 feet in length and not less than 6 inches diameter at the small end and 10 inches diameter five feet from the butt.

To be delivered on or before the 1st day of April, 1884, between the Great North Western Telegraph Company's Station at Chatham and Point Escuminac, New Brunswick, via Blackbrook Mills, the Lower Black River, and the main road, each pole to be laid alongside the roadway and fifty yards apart.

Each tender must be accompanied by an accepted bank cheque, made payable to the order of the Honourable the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party decline to enter into a contract when called upon to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,

F. H. ENNIS, Secretary.

Department of Public Works,
Ottawa, 28th Nov., 1883.



Notice to Contractors.

SEALED TENDERS, addressed to the undersigned and endorsed "Tender for Post Office, etc., Berlin, Ont.," will be received at this office until WEDNESDAY, the 19th December next, inclusively, for erection and completion of

POST OFFICES, ETC.,

AT

BERLIN, ONT.

Plans and specifications can be seen at the Department of Public Works, Ottawa, and the Post Office Berlin, on and after MONDAY, the 26th instant.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque, made payable to the order of the Honourable the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party decline to enter into a contract when called on to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned. The Department does not bind itself to accept the lowest or any tender.

By order,

F. H. ENNIS, Secretary.

Department of Public Works,
Ottawa, Nov. 16th 1883.



Graving Dock.

British Columbia.

SEALED TENDERS addressed to the undersigned, and endorsed "Tender for Graving Dock, B.C.," will be received at this office until FRIDAY, the 8th day of February, 1884, inclusively, for the construction and completion of the partially finished

Graving Dock at Esquimalt Harbor, British Columbia,

According to plans and specification to be seen on and after Monday, the 24th December next, at the Department of Public Works, Ottawa, and on application to the Hon. J. W. Trutch, Victoria, B.C.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied and prices affixed to the whole of the items stated therein, and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque for the sum of \$7,500, made payable to the order of the Honourable the Minister of Public Works which will be forfeited if the party decline to enter into contract when called upon to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

This Department will not be bound to accept the lowest or any tender.

By order,

F. H. ENNIS, Secretary.

Department of Public Works,
Ottawa, 12th Nov., 1883.



ST. LAWRENCE CANAL.

NOTICE to CONTRACTORS.

The letting of the works at the upper entrance of the CORNWALL CANAL, and those at the upper entrance of the RAPIDE PLAT CANALS, advertised to take place on the 13th day of November next are unavoidably postponed to the following dates:—Tenders will be received until TUESDAY, the fourth day of December next.

Plans, specifications, etc., will be ready for examination at the places previously mentioned on and after Tuesday the twentieth day of November.

For the works at the head of the Galops Canal, tenders will be received until Tuesday, the eighteenth day of December. Plans and specifications, etc., can be seen at the places before mentioned on and after Tuesday, the fourth day of December.

By order,

A. P. BRADLEY, Secretary.

Department of Railways and Canals,
Ottawa 20th Oct., 1883. 47-5.

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S $\frac{1}{2}$ " 2, " 11th "		
S $\frac{1}{2}$ " 12, " 11th "		
S $\frac{1}{2}$ " 13, " 11th "		
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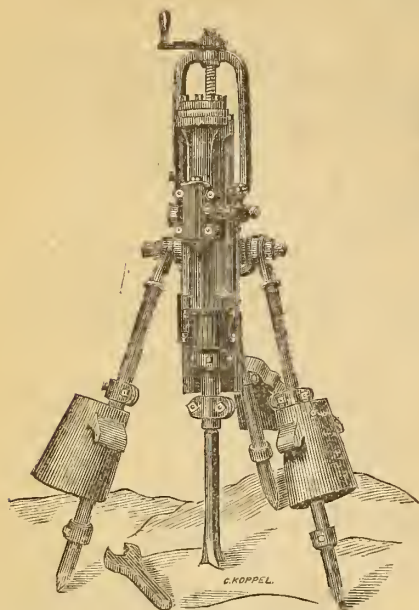
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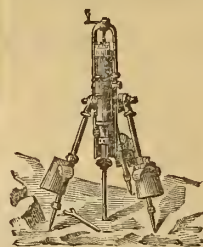
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N $\frac{1}{2}$ and S. E $\frac{1}{4}$	19	15	23	480
S $\frac{1}{2}$ and N. E $\frac{1}{4}$	15	16	23	480
E $\frac{1}{2}$ of N. W $\frac{1}{4}$	15	16	23	80
S $\frac{1}{2}$	3	17	23	320
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VOL. 2.—No. 1.

1883—DECEMBER—JANUARY—1884

VOL. 2.—No. 1

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The CANADIAN MINING REVIEW
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publishers will be thankful for
any encouragement they may receive
from the hands of those who are inter-
ested in its speedy development.

Visitors from the mining districts
as well as others interested in Cana-
dian Mineral Lands are cordially
invited to call at our office.

Mining news and reports of new
discoveries of mineral deposits are
solicited.

All matter for publication in the
REVIEW should be received at the
office not later than the 5th of the
month in which it is to appear.

Address all correspondence, &c.,
to the Publishers of the CANADIAN
MINING REVIEW, Ottawa.

Many of our subscribers have
expressed a wish that the
"Review" should issue on or
about the 15th, instead of on the
1st day, of each month, it was
decided that the day of publi-
cation should henceforth be in
accordance therewith, and we
apologized ourselves of the compar-
atively inactive season at our
press to make this change, by
publishing a DECEMBER AND
JANUARY number.

The heavy falls of snow which have come one upon the other since the beginning of the year, and the extreme cold weather, have, in a measure, retarded the progress of mining operations in Canada, and more particularly has this been the case where a level has not been reached beyond the influence of these unwelcome elements. The inconveniences they occasion are more felt, probably, among the phosphate miners than by those at any other description of mines in the country, and yet, throughout the Ottawa district, the mines are being vigorously worked and phosphate is coming abundantly to the surface—the mineral is being more carefully handled than formerly, in respect to clobbering, and the price now offered for the output is encouraging producers to invest more capital in equipping their mines with such plant as will enable them to proceed with mining operations to the best advantage. An article in another column will convey some idea of what is going on at the phosphate mines, and will give a fair report of last year's shipments and the probable quantity of mineral that will go forward during the season of navigation of 1884.

Mining in Nova Scotia and New Brunswick has been a profitable industry during the year and has been carried on much more actively than for years before, especially in the gold producing districts of the former province. In the Eastern Townships of the Province of Quebec there has been more than an average production of asbestos and copper ores, but we have received no recent report of progress at the mines. The quantity

of gold raised during the year in Beauce district is over the average, and a fair amount of money has been disbursed on account of prospecting which will not have been in vain, as many promising properties have been opened up. Iron mining in Central Canada never offered better inducements to capitalists, and much foreign capital, American and English, has been invested in the industry which is destined to become one of great importance in the country. Throughout those districts to the north of Kingston and Belleville, and contiguous to a portion of the line of the Kingston and Pembroke Railway, much interest is being manifested in the iron deposits, and an extensive section of country has been carefully prospected—new bodies of ore have been discovered and some of them have been tested with satisfactory results. The Haycock Iron Mine, in the County of Ottawa, has passed into new hands, and it is to be hoped that the property will develop so that the company may realize its most sanguine expectations. A new industry has been quite recently inaugurated in the vicinity of Perth by one of the most energetic and successful miners in this section of Canada who is developing a valuable mica property, which promises to yield an almost unlimited supply of the mineral—very clear and white and hardly inferior to that of New Hampshire or North Carolina. Proceeding further to the west, to that section lying to the north and north-west of Lake Superior, the year's operations at the mines have been attended by successful results, some particulars of which are reported in another column under

the head of "The Mining Industries North of Lake Superior." Since the last report in the REVIEW of progress at the Lake of the Woods gold mines and the mines of Manitoba, little has transpired to chronicle, except in a general way—in the former locality some of the mines continue to be carefully worked, and with success, while at others there has been a temporary suspension of operations pending the forthcoming of more capital which is looked for with the opening of spring. The result of the past summer's prospecting in the Rocky Mountains has been many important discoveries of gold, silver, copper and iron, and some capital has already been subscribed in England, the United States and in Canada for their immediate development. Some of the coal mines of the North West Territories have been vigorously worked during the past year and have supplied a large quantity of good coal to the Canadian Pacific Railway Company and to settlers. A vast amount of money is invested in this important enterprise and much speculation has been indulged in by manipulators who have no intention of entering into active mining, but who may be rewarded by over-credulous capitalists being led away by misrepresentation. It is to be hoped that capital, which is so much needed for the legitimate development of our mineral lands, will not find its way into any unprofitable enterprises, and that wild speculation and intrigue will be the last thing to be done in the mining business. The main business has been, and to a great extent is now being, carried on, it must

be said to be unscientific, even primitive; time will correct this however, and at the close of 1884 we will doubtless see still greater advancement in this respect than was accomplished during 1883. From the mining districts of British Columbia no recent news has reached us.

A feverish and unsettled condition, as well as a serious decline in prices, having characterized the Iron trade in England during 1883, it is a remarkable fact that the production of pig iron in the North has exceeded that of any former year, it having reached, as nearly as can be arrived at, not less than 2,765,000 tons, as compared with 2,688,650 tons in 1882. At the beginning of the year prices ranged from 43s. to 43s. 6d., and at the close 36s. to 36s. 6d. were the ruling quotations; showing a decline of 7s. from a price that was considered not more than sufficient to yield a fair margin of profit on cost of production. The excess in the amount produced does not remain with the producers, for it is known that the stock on hand is no more than they were carrying at the close of the previous year. There has been a marked falling off in the exportation of crude iron during the year, remarkable in the quantity sent to the United States, and this, in addition to the fact that the production was greater than that of any former year, leads to the conclusion that the demand for home manufacture was brisk, and, in a notable degree, exceeded what has ever before been known in the history of the English Iron trade. Large imports of ore from Spain and other countries have been made into Wales, Durham and Scotland. In Scotland there has been the same large production, and in the Cleveland and Durham districts the output shows the largest record in the history of the trade. Yet prices have declined.

Attention is directed to Mr. Obalski's advertisement in another column on behalf of a French Company who desire to purchase copper ores and mattes.

THE PHOSPHATE ROCKS.

Nature of the Deposits. Will Deep Mining Pay?

BY HENRY G. VENNOR, F.G.S.

In the present active state of phosphate mining and general enquiry concerning our mines, it will be of interest to consider briefly the conditions of the deposits, and more particularly what evidence there is of these being deep-seated. I have elsewhere stated—and oftener than once—that the apatite rocks were, geologically considered, superficial. Hence the query naturally arises, Will deep-mining pay?

This question is an important one at the present time when so much capital is being invested in mines and mining properties, but, in so far as I have seen, no answer of a satisfactory nature has yet been given. The question, however, is a simple one, when we look into the nature of the deposits, *i.e.*, their geological conditions. The miner, who hitherto has been at work at economic ores in *true fissure veins* cutting alike all the rocks of a particular mining district, is entirely at sea when he is placed in the phosphate field. He may talk as he pleases about being on or off the "main lode," but of one thing only is he really certain, and that is of being supremely puzzled. Tell him to search in the direction of the bedding and he will laugh you to scorn and inform you that "true veins" but rarely run so. Yet, such is the truth—the very truth—in the case of phosphate deposits. These are nothing more than a series of irregular (large and small) masses distributed along one or two plains of bedding in *one particular belt of rock*. Leave this *particular belt* and you lose your phosphate: follow it, and you continue to discover new deposits. As is only natural, of course, and the case with iron ore and similar deposits, *true veins* occur as *spurts* or infiltrations from these embedded masses, but only run for very limited distances. The very finding, however, of one or two of such *veins* is enough for the embryo mineralogist and geologist, and he hastens to set it down as an established fact, that as such are our economic deposits of apatite.

The phosphate rocks, geologically speaking, are superficial, and have many thousands of feet of strata beneath them, but with this the practical miner has

nothing to do; they are plenty deep enough for his purpose, and he may rest assured of still finding his mineral in workable deposits as deep as he cares to delve. For example, let us take the rich outcrop of phosphate rock along the du Lievres river. This dips off to the westward at a high angle and plunges down to unknown depths, but comes up to the surface again in Wakefield—away over on the Gatineau river side—still carrying its phosphates. Now, as we cannot by any common sense reasoning conclude that the deposits of mineral are exclusively confined to the two outcrops of the rock, the one in the du Lievres and the other on the Gatineau side, it must be inferred that these continue with the rock to great and unknown depths in the interval of country between the rivers named. Consequently I have no hesitation in affirming that the mineral "goes deep"—but as to whether the miner can mine deeply is quite another question, and depends entirely upon the size and nature of the deposit or deposits he is following down. I do not believe that any one mass of apatite will ever be found to run connectedly to a great depth, but possibly by means of "stringers" one mass may lead to the discovery of another much lower down. It is doubtful, however, whether such mining would prove remunerative, as the removal of much barren rock between the deposits would in all probability turn the balance in favor of abandoning the opening.

As an illustration of great *fissures* in this same district, I would allude here briefly to the groups or series of trap dykes which intersect the strata continuously for miles at a stretch. These undoubtedly represent or mark out the direction of great rents or *fissures* by which the rocks were affected at some period subsequent to the deposition of the phosphate of lime. Now, had these great rents through the strata become filled with the mineral last named instead of the doleritic trap, we would have just the sort of thing most of our miners are and have been looking for, namely, "main lodes," "true veins," etc. of phosphate of lime, and we would have something more tangible and definite to base our calculations upon respecting deep mining. Another illustration of the condition in which the deposits of this mineral occur may be found in the distribution of the proper or *parent* rock through Ottawa County, which

clearly establishes the fact of the rock *carrying the mineral with it*, and not the mineral *traversing merely one particular portion of it*, as must be the case were we to fix upon the *true vein* theory. We have, for instance, one particular volume of rock signally impregnated with the mineral in grains, veins, and masses large and small. The rock is not bedded, but is of a granitoid structure and highly crystalline. The chief constituents are pyroxene (in grains and crystals), hornblende, feldspar, calcite and apatite—with a greater or less admixture of iron pyrites which generally gives to both rock and apatite a reddish brown weathered appearance. In such a volume of rock are all of the deposits of mineral of an importance hitherto discovered either in Ottawa County or in the Rideau section towards Perth and Kingston in the Province of Ontario. Go where one will in the course of this belt of rock phosphate of lime is found in one form or another, but leave it (the proper belt) and travel across the strike of the rocks (*i.e.* contrary to their run) and very speedily a trace of the mineral is lost. Beyond this thoroughly established truth nothing further is wanted in proof of the bedded condition of the main deposits.

GEOLOGICAL MUSEUM

The number of persons who registered their names as visitors to the museum of the Geological Survey this city from 1st January, 1883, 1st January, 1884, was 12,027. In addition to these, however, a considerable number of gentlemen, who did not enter their names in the museum book, called every day the various officers of the Survey and many of them inspected the museum before leaving. These, it is estimated, would increase the above figure by from 3,000 to 5,000 so that the total number of visitors during the year 1883 may be safely set down at 15,000, or about times the average number while the museum was in Montreal.

THE PHOSPHATE MINES OF OTTAWA COUNTY.

More than ordinary interest has been directed towards the phosphate mining industry in this section during the year just closed, and is rapidly increasing in importance. Speculation and the manipulative properties have given place to legitimate mining, and mine owners in most cases, preparing for permanent working. The mines are developing well and, wherever operations have been prosecuted with ordinary

care and judgment, fair profits have been realized—in some instances the net profits on last year's output have reached 100 to 300 per cent. on actual cost of production and delivery—many of the mines have greatly increased in value during the year—the facilities of access to the mines, and for summer transportation of the ore, have been improved to a great extent and it may be said that the prospects for a successful future were never brighter than at the present time.

In the Township of Portland West the "High Rock" and the Union Phosphate Company's mines are the most important. The first mentioned property, according to reports recently received, continues very productive and the openings that are now being worked look favorable for an abundant yield. The U. P. Co.'s mines have developed well, and another extensive deposit of mineral has been lately discovered on the company's property which has added to its value. During the short time this location has been in the hands of its present owners much has been accomplished by them, and there is no doubt that the year just entered upon will be one of prosperity for the company. The "High Rock" and U. P. Co.'s mines employ about 75 men each.

In Portland East the Dominion Phosphate Company have begun work in earnest and their "North Star" mine is developing most satisfactorily. Sixty miners are now employed on this property, and the company, having completed the dead-work, will give attention in future exclusively to taking out ore. The "North Star" mine is capable of yielding a large annual output of highest grade ore, and the future will prove the wisdom of employing a force adequate to its capacity. The capital stock of the company has been increased from \$75,000 to \$125,000, and at a general meeting of the stockholders, held in Montreal in December, some other important business was transacted. The stockholders are now confident of receiving a handsome dividend in the near future, and with proper management their expectations will surely be realized. The French Company continues to work some of their properties in this township and employ about 35 miners.

At the "Watt" mine in Buckingham Township Mr. Allan has a force of 12 miners employed, and the property has much increased in value since he purchased it but a few weeks ago. On this property there are several shafts sunk to considerable depth, the deepest of which is about 170 feet, and in each of them is a bed of phosphate extending across the bottom of the shaft, and sinking to the depth that has been reached many veins of rich mineral have been cut through, upon which no stopping has yet been attempted. Some new ground has already been opened and has developed most satisfactorily. Mr.

Allan's success in phosphate mining has been due to his unerring judgment, his energy and the business-like manner in which he has always conducted his mining operations, and these three useful qualifications he will doubtless exercise in the developing of the "Watt" mine.

Of the "Emerald" mine, in the same township, little if any more can be said than that it is the most valuable phosphate mine yet discovered in Canada, and its owners are very much pleased with their purchase. A good force of miners, numbering about 45, are working in the ore bed from which mineral is being abundantly raised, and the mining, which is conducted by an experienced Cornish miner, is carried on in a systematic and careful manner.

In the Township of Templeton the McLaurin Mines are being vigorously worked with a force of about 30 men, and good work is being done on the properties owned by R. C. Adams, Jackson Rae and Gillespie, Moffatt & Co., of Montreal. At the Post mine, and at one owned by the Roach estate, of Quebec, active operations have been suspended. In the same township Mr. G. Cowan is opening some properties owned by the Perkins estate, and Laurie & Co., of Montreal, have recently begun work on a lot in the 7th Range, which shows signs of developing into a mine of some importance.

In the Township of Wakefield the "Haldane" mine is yielding well, and the "Moore" mine, which is now under contract, is yielding a fair quantity of high grade phosphate. The "Gemmill" property still retains the high reputation it has enjoyed for years past, and yields a steady output of mineral, the quality of which has long since established the reputation of the mine.

At other less important mines work is going steadily ahead and helps to increase the aggregate annual shipment from the district. From many of the mines in the county some mineral has already been delivered at point of shipment, but from those contiguous to the Du Lievre River there has been no hauling done yet. It was expected that transportation would have been practicable on the river about the 10th January, but the quantity of snow that has fallen since then will in all probability cause delay.

Phosphate Quotations.

No fluctuation has been reported during the past month in the value of Canadian phosphate in the foreign markets. It is quoted from at 1s. 3d. per unit for 80 per cent. mineral on wharf at Liverpool, London, or Glasgow. This is equivalent to \$20 per ton delivered in Montreal.

Phosphate Shipments for 1883.

The total quantity of phosphate shipped from Canada during the season of navigation of 1883 amounted to 17,840 tons, and was forwarded to foreign ports as follows:

To Liverpool	7313 tons.
" London	3625 "
" Bristol	1951 "
" Hamburg	1576 "
" Glasgow	942 "
" Stockholm	650 "
" Dublin	400 "
" Swansea	375 "
" Gloucester	374 "
" Cardiff	200 "
" Barrow	180 "
" Plymouth	129 "
" Hartlepool	107 "
" Hull	18 "

Total..... 17,840 tons.

[About 15 % of this total was forwarded from mines in the Kingston and Perth districts, the balance (85 %) was the output of the mines of Ottawa County.]

As nearly as can be estimated at present the mines now in operation will produce for shipment, before the close of navigation this year, as follows:

TOWNSHIP.	TONS.
Portland W., Ottawa Co.	8,000
" E., " " ...	3,000
Buckingham " " ...	6,000
Templeton " " ...	3,000
Wakefield " " ...	1,000
	21,000
Kingston and Perth districts,	3,000
Total	24,000

This is of course nothing more than an approximate estimate, but the present appearance of the mines and the quantity of mineral already raised are fair indications that the total output for the season of 1884 will be in excess of that of last year quite 6,000 tons.

MICA.

The demand for good mica has so increased during the past year that its market value has greatly advanced and, as a consequence, there has been a vigorous search for deposits of this mineral. Mr. W. A. Allan, of Ottawa, is among the first to secure a location in North Burgess capable of producing merchantable mica in any quantity, and he has already ten men at work. Three shafts have been sunk on the property to a depth of 18, 25 and 35 feet respectively, and a quantity of excellent mica has been obtained. At the bottom of each pit there is a strong micaceous lead with bodies of well formed crystals, some of which will cut into sizes 8x10 inches, and all of them are capable of producing marketable sizes in clear white sheets. It is certainly a valuable mine, and Mr. Allan is to be congratulated for his foresight in securing it.

THE HAYCOCK IRON MINE.

Much has been said about the resumption of work on this property under the management of a wealthy English organization, and as time rolls on, the people of Ottawa become anxious for more substantial information on the subject than can be gathered from newspaper reports and street rumor. It would seem that negotiations, for the present, are at a standstill. A strong company has been organized in England with large means, and to all appearances, with a full determination to proceed with operations, when negotiations will have been definitely closed. Eminent experts have been sent from England and elsewhere to examine the deposits, and their reports have been favorable to the property. A fair sum of money has been paid, which looks like an evidence of good faith, and it is but reasonable to assume that the transfer will eventually be consummated; but why this prolonged delay?

THE MINING INDUSTRY

OF

New Brunswick and Nova Scotia.

A newspaper correspondent who has been looking up the mining interests of the Eastern Provinces finds that there is an abundance of good iron ore (hematite) on the Cobequid Mountains at Acadia Mines, N. S., where the Canada Steel Company has located works giving employment to 500 men. The output of ore last year was 50,000 tons which was made into pig and bar iron, car wheels, etc., valued at over \$600,000. Iron ore is found in other localities, but not to any such extent as here.

The largest colliery in Canada is at Spring Hill Mines, N. S., where about 500 men are employed, and the output last year amounted to 200,300 tons of coal, or nearly one sixth of the entire production of Nova Scotia. At Stellarton, N. S., 141,000 tons of coal were raised last year, and 12,512 tons of coke manufactured. At Sydney, Cape Breton, the coal fields underlie over two hundred square miles, the greater part of which is under the Atlantic. Mining rights covering over one half of this submarine coal have been taken out. The Sydney mines give employment to about 1,500 men, and coal is seen, smelt, and felt everywhere. At Pictou, N. S., coal has been exported since 1798, though the amount was small till 1829. It is now the principal business of the port. At Bridgeport, C. B., the International Coal Mines give employment to 300 men and boys, and the output for last year was 109,286 tons. At the Joggins Mines, N. S., an attempt has been made to obtain railway facilities from Macan on the Intercolonial Railway, so that the coal now mined there may find a more ready market. The famous

Albertite coal that was obtained from the Albert Mines, N. B., for several years, has become exhausted, and mining has been discontinued.

As regards the gold product, the following figures will serve to indicate the value of the mines: At Mount Uniacke, N. S., there are three gold mines and four quartz mills. Last year 3,440 tons of quartz were crushed, furnishing 9,128 days' employment, and yielding \$3.52 per day per man. This was the best return of any mines in the Province. At Sherbrooke, N. S., the ore is low grade, but easily worked and distributed in large quantities over an area of eighteen square miles. The yield of six quartz mills last year was 2,572 ounces, 17 penny-weights, 14 grains. At Goldenville, three miles from Sherbrooke, \$500 was found the day the mines were discovered in 1861, and there has been a yield of \$2,000 per man, per year, during some years. At Tangier, N. S., the yield last year was 789 ounces from 1,622 tons of ore. At Waverly, N. S., the yield was 234 ounces, 7 penny-weights, 5 grains, from 554 tons of ore; three mines having been worked and 2,238 days' labor performed. At Wine Harbor, N. S., the ore is easily worked, but poor, yielding only 94 cents per day per man. At Country Harbor, N. S., 903 ounces were obtained last year from 511 tons of quartz, and the Oxford Gold Mining Company, of Chezzetcook, N. S., obtained \$6,800 from 130 tons of ore worked during twelve days in last May.

NOTE.—Where the term "last year" is used it refers to 1882.

THE MINING INDUSTRY NORTH OF LAKE SUPERIOR.

At Silver Islet, about 50 miners are employed, a depth of 1,200 ft. has been reached, and on the 1,160 ft. level they are drifting both ways. The mine is said to be yielding silver in paying quantities. This company own a large tract of land on the main shore at Mamainse, which has been successfully prospected, and native copper, yellow and gray copper ores in veins have been discovered, as well as native silver, said to be very rich. On the property adjoining this last mentioned location, the Lake Superior Native Copper Company are expending about \$12,000 per month, and employ 175 men. A shaft has been sunk 200 ft. and in one of three levels they have drifted 600 ft. The ore at the depth obtained carries about 3 per cent. of metal. The Michipicotin Native Copper Company are doing good work at their mine, to the N.W. of the L.S.N.C. Co's. property, and it is said they have struck ore rich in native copper. Both of these mines are being worked by English capital. Within 25 miles of Port Arthur

the Rabbit Mountain Silver Mine is located, and of this property much has already been read in the Canadian press. Nuggets of black silver, weighing as much as 12 lbs. each, have been taken from the vein, through which silver appears well disseminated. The vein is unquestionably a large one, and a large quantity of silver is in sight. The Rabbit Mountain District is eminently a silver bearing country, and it has, as yet, been but partially explored. To the north and west of Rabbit Mountain, around Lakes Shebandowan, Kashabowie, and north of Lac des Milles Lacs, sufficient prospecting has been done to prove it to be a gold bearing district. Free gold has been found here, and some of the quartz taken from a vein near Partridge Lake yielded \$30 to the ton. To the west of Lake Shebandowan, the Huronian Company's gold and silver mine is located, near Jack Fish Lake, and it may be said that this is one of the richest mines, at which work has been done, that has yet been discovered in the Lake Superior region, and it is satisfactory to know that it is being actively and carefully developed by a strong Canadian Company. The vein, which is a large one, is rich in mineral, and is free milling, a shaft is down 50 ft., and a drift of as many feet has been run on the vein from which a large quantity of rich ore has been raised. The company have a ten-stamp mill and four Frue Vanners ready to begin work on the ore, and it will not be long before the result of milling will be made known. It is a certainty that the Lake Superior district is rich in mineral, and when capital is available for the proper development of the mines their yielding capacity will be demonstrated, but not till then.

THE HURONIAN MINE.

A letter from the manager of this mine lately received by a gentleman in this city gives a very encouraging account of the work. He states that the vein has held good all the way from the surface to the present depth both as to size and the show of gold. The stamp-mill had commenced running and worked well. The difficulties arising from the isolated position of the mine had been surmounted, all supplies had been delivered and a force of men was engaged in cutting a main road from the Barrel Portage, which is a much more direct course from Port Savanne than the old route by Shebandowan Lake. The company, whose head office is in Ottawa, is working in a thoroughly *bona fide* manner, having expended upwards of \$30,000 in the actual development of the mine itself, and it is deserving of the success which is attending its operations.

WELLINGTON COAL.

The coal from the Wellington Mines, at Vancouver, B. C., has become very popular in San Francisco, Cal., evidenced by an article which appeared in the *S. F. Call*, 29th Nov., as follows: "The *Bar-nard Castle*, with Wellington coal, is due here to-day. So great is the demand for this coal that carts and waggons began to arrive on the wharf Tuesday morning, and by night a line two blocks in length had formed, which camped out with the intention of staying till the steamer arrived. Many of the men at night slept in their carts, and the horses are fed where they stand."

General Manager Van Horn, of the Canadian Pacific Railway, expresses himself highly pleased with the abundance and the quality of the coal in the North-West. The supply is practically unlimited, and as the railway is said to consume a ton every two minutes, Mr. Van Horn's pleasure on account of its presence in a section of the country so remote from other coal fields and so sparsely timbered, cannot be wondered at.

Gold Discovery in Norway.

The *London (England) Mining Journal* reports the discovery of gold in Norway, and attaches much importance to it as it is stated that, thus far, the development of the lode has revealed what is considered to be one of the most wonderful auriferous veins that has been met with in any country for many years. A well known eminent practical authority has recently examined the property, and his report fully warrants the views above expressed. He brought home a number of samples (each weighing over a quarter of a hundred-weight) taken from much larger quantities of stuff shot down from the lode, well mixed and divided, the essays of which give exceedingly good results, while a number of selected specimens are extremely rich; one stone in particular having a strong branch of gold about an inch wide running through it, which can be seen in the lode where this stone was taken from; the gold in the specimen alone is valued at £60 (about \$300). A private company is being organized in England with ample means to carry on operations on the property in an approved and business-like manner. The property is easily accessible, and it is no inconsiderable advantage that it is within two days' journey of England. Great results are expected, and report of progress in development work on the lode will be looked for with much interest the world over.

Australian Nuggets.

These have been the largest ever found, "as may be seen from the undergiven list of some of the largest in the Colony of Victoria. In this Colony nearly a hundred have been unearthed that averaged 370 ounces of gold; six of these realized for their fortunate owners:

The Welcome Stranger, found near Dunolly.....	\$46,361
The Welcome, found near Ballarat....	45,366
The Blanche Barkley, found near Kingower.....	33,693
Nugget, unnamed, found near Canadian Gully.....	27,812
The Heron, found near Fryer's Creek	19,848
Lady Hotham, found near Canadian Gully.....	14,595

Total value of six nuggets.....\$187,675
Average.....31,279

N. Y. Mining Record.

THE SOURCE OF THE ALLUVIAL GOLD IN THE NORTH-WEST TERRITORIES.

It has long been known that alluvial gold is found in the North-West Territories on the rivers flowing eastward from the Rocky Mountains. The Peace River and the North Saskatchewan have been especially noted in this connection. Now that the precious metals have been discovered in small quantities in the Rocky Mountains, near the proposed route of the Canadian Pacific Railway, the question is again asked, may not the gold of the Saskatchewan have been washed down the rivers from the mountains? This was the original popular theory, until many years ago, when Professor Bell, of the Geological Survey, showed that it was much more probable that the gold came from the northward than the west. (See Report Geo. Survey 1873, p. 86.) This opinion has since been quoted by Professor Hind and Dr. Selwyn. The gold, as Dr. Bell showed, is washed out of the drift which covers the auriferous strata of the plains, and as this drift came from the northward (as proved by its composition) it follows that the gold came from this quarter also. In the report referred to, it was supposed that the gold might have been derived from Huronian rocks in the direction of Lake Athabasca, and since that time these rocks have actually been found to be well developed on this lake; but, although some of the alluvial gold of the plains may have had its source in this direction, Professor Bell is of the opinion that it is quite as likely that the gold of the North Saskatchewan has been brought by the ancient glaciers from the valleys of the upper part of the Liard River and the northern branches of the Peace River. The reason why the gold is not found much above Edmonton is owing partly to the slope of the ground, and partly to the smaller glaciers of the drift period in that latitude proceeding eastward from the Rocky Mountains, keeping the great glaciers from the northward from approaching any nearer to the mountains.

The most reliable assays of ores from the recent discoveries in the Rocky Mountains, above referred to, show but little gold, and even if more should prove to exist the locality is too far south for any of it to have found its way into the North Saskatchewan, at the sources of which no gold has yet been found.

On the other hand, it is well known that rich placers exist on the upper branches of the Liard and large quantities of gold have already been taken from them, especially in the Cassiar District. It therefore appears to us that Professor Bell's explanation accounts best for all the facts.

MINERALS OF THE HUDSON'S BAY TERRITORIES.

The report of the Select Standing Committee, on Immigration and Colonization, of last session which has lately been published, contains much valuable information on the country around Hudson's Bay. In the evidence of Professor Bell, of the Geological Survey, we find the following in answer to a question by Captain Scott, of Winnipeg: "In a general way, in the Hudson's Bay territories are there many useful minerals?" "As far as we know there are, but very little search has been made. I can, however, mention numerous minerals which are already known to exist. They embrace iron, as hematite, magnetite, clay ironstone and rich manganese iron ore on the Eastmain coast, copper in the native state, and in various combinations, lead, silver, gold, molybdenum, antimony, manganese, chromium, phosphate of lime, jade, chrysoprase, agate, carnelian, malachite, jasper, serpentine, jet, lazulite, petroleum, asphalt, peat, anthracite, bituminous coal, lignite, limestone, granite, sandstone, and sand for glass making, moulding sand, clays, marls, ochres, gypsum, iron pyrites, salt, medicinal waters, sheet mica, soapstone and plumbago.

"These are all known to occur, many in various parts of the territory and most of them certainly well worth looking after. Sir John Richardson mentioned that he thought it would be to the advantage of the Imperial Government and the Hudson's Bay Company to explore the country for minerals. He was convinced that it would not be long before the value of the mines of the Hudson's Bay territory would far surpass that of the fur trade."

PERSONAL.

Mr. W. H. Williams, President of the Union Phosphate Mining and Land Company, will be a passenger on the *Arizona*, from New York, on the 29th of January. Mr. Williams' object in going to England at this season is to complete arrangements there for the receipt of the output from the phos-

phate mines in Ottawa County owned by the company, of which he was the founder.

The numerous friends of Capt. R. C. Adams, of Montreal, who has occupied so prominent a position among the phosphate miners of Canada for years past, will have learned with regret that he was one of the victims in the accident on the Canadian Pacific Railway some days ago, and all of them will look for report of his speedy recovery.

Mr. G. A. Mountain, D.L.S., and P.L.S. for the Provinces of Ontario and Quebec, has recently returned to Ottawa, after successfully passing his examinations for P.L.S. in Ontario. Mr. Mountain received his diploma for the Province of Quebec some years ago, and in 1882 he passed a brilliant examination before the Dominion board at Ottawa, receiving the maximum marks. His many friends in the city were pleased to have another opportunity to congratulate him on his return to the city after his recent achievements in Toronto.

MINING NOTES.

At the oil wells at Bellevue, Westmorland County, N.B., the prospects are not so bright as has been reported. At a depth of 657 ft. it is said that oil flowed copiously. Now that a depth of 900 ft. has been reached no oil is noticeable in the boring.

The diggings at the Bridge River Gold Mines, about 60 miles from Lillooet, B.C., are attracting some attention. Two men, it is said, washed \$527 in one month previous to closing down for the winter.

The Manganese mines at Markhamville, N.B., have been worked continuously for over 25 years and produce ore valued from \$16 to \$100 per ton.

The Oxford Gold Mine, N. S., yielded \$10,300 in bullion for the month of November, the cost of production being but \$1,700.

The gold, silver and lead product of the Colorado mines during 1883 has been valued at \$26,126,130.

The gold yield of the United States mines during 1883 reached a valuation of \$32,000,000.

The products of the Montana gold mines will reach \$15,000,000 for 1883.

DIVIDENDS DECLARED.

THE STANDARD CONSOLIDATED MINING COMPANY, Cal., paid in December their regular monthly dividend, and an extra dividend aggregating \$50,000. Thirteen dividends paid during the year amounted to \$325,000. This company has declared its seventy-ninth successive monthly dividend, payable January 12th, aggregating \$25,000, thus swelling the total

amount of dividends to date to \$4,400,000.

THE IDAHO GOLD MINING COMPANY, of Grass Valley, Cal., raised their dividend in December to four dollars a share, aggregating \$12,400. Total of twelve dividends during 1883 amounted to \$82,000.

THE HOMESTAKE MINING COMPANY, of Deadwood, Dakota, declared their regular monthly dividend, payable on 26th December, aggregating \$25,000. Total dividends for the year, \$225,000.

THE CONTENTION CONSOLIDATED MINING COMPANY, of Arizona, paid a dividend of 25 cents a share on 24th Dec., aggregating \$62,500. Seven dividends during the year amounted to \$437,500.

THE ONTARIO MINING COMPANY, of Utah, paid in December their nineteenth dividend, for 1883, aggregating \$75,000. Total dividends to date, \$5,150,000.

Sixty gold, silver, and copper mining companies of the United States paid out \$9,871,600 in dividends during 1883.

THE IRON DEPOSITS OF CENTRAL CANADA.

An evidence of the importance attached to Canadian Iron deposits by our more enterprising neighbors beyond the border was given in New York on the 27th of December, when a meeting of influential merchants was convened at the Fifth Avenue Hotel to arrange preliminaries for bringing about an agreement by which coal and iron ore will be allowed to enter free of duty into Canada and the United States. Those interested in mining coal in certain bituminous districts of Pennsylvania and Ohio, and those engaged mining iron ore in Canada and in manufacturing pig iron in the United States, are in favor of such reciprocity. Another evidence of the impetus that may be looked for to iron mining in Canada is the interest evidenced in the industry by the *American press*. The following letter by Mr. M. C. Read, member of the Ohio Geological Survey, was recently published in the *Trade Review and Western Machinist* of Cleveland, O., and is highly commendatory of the value of many of the deposits in certain iron-bearing districts:

"As early as 1852-3 the Canadian Geologists called attention to the iron ores, both hematite and magnetic found in this county. In 1866 Mr. Thomas Macfarlane contributed to the geological survey of Canada a special report upon these ores which was followed by Mr. Henry G. Vennor with a more detailed report in 1869. The presence of excellent ore was noticed by these geologists in various parts of the county and in the townships of Madoc and Marmora considerable ore was mined many years ago, but the extent and magnitude of the ore deposits in the county has been until recently very

inadequately appreciated. Some years ago Mr. Coe, an enterprising Englishman residing in the village of Madoc, commenced a systematic examination of the more unexplored parts of the county and gradually obtained the title to much of the most promising territory. Some three years ago he obtained the co-operation of the Messrs. McMullens of Picton, Ontario, and S. J. Ritchie, of Ohio, men who had the enterprise and means requisite for the development of the mineral resources of the county. After a careful examination of the territory, and repeated analyses of specimens of the ore from different exposures, these gentlemen secured the title to something over 100,000 acres covering the mineral belt, purchased a railroad from Picton to Trenton, and obtaining a very favorable charter from the Dominion Government, continued the road northward and are now laying the track on the graded bed of the north half, at a rate which promises the completion of the road to several of the principal mines during the coming month. They have obtained a route, with light grades and long curves, are building the road in the most substantial manner with steel rails and steel bridges; have purchased the entire frontage of an excellent harbor on the lake, are building extensive piers and securing every appliance needed for the cheap and rapid transfer of the ore from the mines to vessels on the lake.

The character of the deposits of ore will be better understood after a brief description of the geological structure of the district.

The silurian limestone covers the Southern part of the county, resting unconformably upon the underlying rocks, which the Canadian geologist designates as Laurentian. They are substantially on the same horizon as the Huronian rocks of Lake Superior and it is pretty certain that they are of the same age.

The upper division of these rocks consists of a series of limestone and calcareous schists, Gneissoid quartzites with silicious and mica slates, attaining in all a maximum thickness according to Mr. Vennor's report of over 21,000 feet. Below this is mass of Hornblende rock with various quartzites and green stones, reaching in places, according to the same authority, a thickness of over 4,000 feet. This is the feriferous divisions and includes the important ore beds of the district. Below this is a vein of Syenitic Gneissoid and limestone rocks attaining a thickness according to Mr. Vennor of over 12,000 feet, all of which is geologically below the iron bearing rocks. A series of upheavals, with subsequent denudation through glacial action has left this lowest of the rock series, as the surface rock, over large areas, has exposed the upturned edges of the iron bearing rocks and disclosed their presence over a large part of nine townships in the county.

To be continued.

Incorporated Dividend-Paying Mines of the United States.

NAME AND LOCATION.	Latest quotation per share.	Current value of Mine.	Number of Shares.	Par Value.	Capital Stock. Dollars.	Last Assessment.		No. of Assessment.	Total Assessment to date.	Last Dividend.		No. of Dividend.	Total Dividends to Date.
						Date.	Amount per Share.			Date of Payment.	Amount per Share.		
Alice G. and S. M. Co., Montana.....	\$2 50	\$1000000	400000	\$25	10000000	not assessable..	.....	.....	.....	Dec. 15, 81.....	10	10	\$400000
Amie Con. Mining Co., Col.....	09	45000	500000	10	5000000	.....	.....	.....	.....	October 2, 83.....	7	7	330000
Atlantic Copper M. Co., Michigan.....	6 00	240000	40000	25	1000000	April 5, 75.....	.....	.....	180000	Feb. 1, 83.....	4	4	220000
Bassick Mining Co., Colorado.....	7 00	700000	100000	100	10000000	.....	.....	.....	.....	Dec. 26, 83.....	1 00	4	325000
*Black Bear Quartz Gold M. Co., California..	.....	.....	30000	100	3000000	.....	.....	.....	15000	Dec. 28, 83.....	20	84	887000
Boston & Montana Gold M. Co., Montana...	.....	.....	200000	10	2000000	.....	.....	.....	.....	Jan. 10, 83.....	05	17	310000
Bodie Con. Mining Co., California.....	40	40000	100000	100	10000000	December 21, 83	.....	5	250000	Nov. 15, 82.....	20	21	1370000
Bulwer Con. Mining Co., California.....	55	55000	100000	100	10000000	December 12, 77	.....	1	30000	July 2, 83.....	05	18	165000
Chrysolited Silver Mining Co., Colorado.....	1 10	220000	200000	50	10000000	not assessable..	.....	.....	.....	Dec. 10, 81.....	50	11	1600000
Consolidated Gold Mining Co., Georgia.....	.....	.....	100000	5	500000	.....	.....	.....	.....	October 10, 83.....	02	27	106000
California Gold Mining Co., Gilpin Co., Col.	.....	.....	130000	.....	.....	.....	.....	.....	.....	August 13, 83.....	25	2	65000
Calumet & Hecla Copper M. Co., Michigan..	237 00	23700000	100000	25	2500000	.....	15 00	.....	1200000	Nov. 15, 83.....	5 00	.....	24350000
Carbonate Hill Mining Co., Col.....	.....	.....	200000	10	2000000	.....	.....	.....	.....	July 2, 83.....	05	6	60000
Catalpa Mining Co., Leadville, Col.....	30	90000	300000	10	3000000	not assessable..	.....	.....	.....	June 9, 83.....	10	5	240000
Castle Creek Gold (Placer) M. Co., Idaho...	20	200000	100000	1	100000	.....	.....	.....	.....	Nov. 16, 83.....	04	18	55000
Central Copper M. Co., Michigan.....	21 50	430000	20000	25	500000	Sept. 10, 61.....	65	.....	100000	Feb. 1, 83.....	3 00	21	1670000
Christy Mining Co., Silver Reef, Utah.....	.....	.....	60000	100	6000000	.....	.....	.....	.....	Oct. 2, 83.....	10	15	90000
†Contention Company, Arizona.....	.....	.....	250000	50	12500000	.....	.....	.....	.....	Dec. 24, 83.....	25	19	1125000
Copper Queen Mining Co., Bisbee, Ariz.....	.....	.....	250000	10	2500000	.....	.....	.....	.....	October 16, 83.....	50	17	1025000
Crescent Mining Co., Utah.....	20	120000	600000	.....	.....	.....	.....	.....	.....	October 25, 83.....	05	4	150000
Deadwood-Terra Mining Co., Black Hills...	.....	.....	200000	25	5000000	not assessable..	.....	.....	.....	Jan. 20, 83.....	10	26	\$900000
Dean Mining & Prospecting Co., ot Col.....	.....	.....	100000	.....	.....	.....	.....	.....	.....	Dec. 1, 82.....	50	1	50000
Dunkin Mining Co., Col.....	21	42000	200000	25	5000000	.....	.....	.....	.....	October 2, 83.....	16	16	210212
Evening Star Mining Co., Col.....	.....	.....	50000	10	500000	not assessable..	.....	.....	.....	October 25, 83.....	50	56	1400000
Eureka Con. Silver M. Co., Nevada.....	2 00	100000	50000	100	5000000	Sept. 20, 83.....	1 00	6	300000	July 27, 82.....	25	25	4817500
Father DeSmet Con. Gold M. Co., Dakota...	3 00	300000	100000	100	10000000	Nov. 13, 78.....	.....	2	200000	Dec. 31, 83.....	20	30	720000
Franklin Copper Mining Co., Mich.....	10 00	440000	54000	.....	.....	June, 77.....	.....	.....	360000	Jan. 1, 84.....	2 00	.....	320000
Grand Central Mining Co., Tombstone, Ariz.	.....	.....	100000	100	1000000	.....	.....	.....	.....	December, 82.....	50	16	800000
Great Western Quicksilver M. Co., Cal.....	.....	.....	50000	100	5000000	August 25, 73.....	15	.....	35500	October, 82.....	25	.....	262500
Hecla Con. Mining Co., Montana.....	.....	.....	30000	50	1500000	.....	.....	.....	.....	Jan. 1, 84.....	50	.....	567500
Homestake Mining Co., Deadwood, Dakota...	11 00	1375500	125000	100	12500000	April 8, 78.....	.....	2	200000	Dec. 26, 83.....	20	64	2237500
Holyoke Mining Co., Idaho.....	.....	.....	200000	.....	.....	.....	.....	.....	.....	Nov. 19, 83.....	02	14	58000
Horn Silver Mining Co., Utah.....	6 20	2500000	400000	25	10000000	none.....	.....	.....	none.....	Nov. 15, 83.....	50	11	2800000
Hope Mining Co., Montana.....	.....	.....	8000	.....	.....	.....	.....	.....	.....	Dec. 31, 83.....	1 50	.....	124339
*Idaho Gold M. Co., (Grass Valley) Cal.....	.....	.....	3100	100	310000	.....	.....	.....	.....	Dec. 3, 83.....	4 00	1 69	3300150
*Indian Queen Mining Co., Nevada.....	20	600000	300000	2	600000	Feb. 11, 80.....	15	3	12000	July 2, 83.....	03	31	374000
Iron Silver Mining Co., Leadville, Col.....	1 90	1450000	500000	20	10000000	.....	.....	.....	.....	Jan. 9, 84.....	20	13	1120000
Jocustita Mining Co., Mexico.....	.....	.....	100000	100	10000000	.....	.....	.....	.....	Nov. 30, 83.....	50	10	950000
Kentuck M. Co., Nevada.....	.....	.....	30000	100	3000000	Nov. 23, 81.....	.....	17	342005	Jan., 84.....	10	41	1279000
La Plata Mining & Smelting Co., Col.....	.....	.....	200000	10	2000000	not assessable..	.....	.....	.....	October 2, 82.....	30	35	610000
Leadville Con. Mining Co., Col.....	45	180000	400000	10	4000000	.....	.....	.....	.....	Dec. 20, 83.....	05	18	370000
Little Chief Mining Co., Col.....	60	120000	200000	.....	.....	.....	.....	.....	.....	Jan. 22, 84.....	10	9	740000
Mt. Diablo M. Co., Nev.....	2 00	100000	50000	.....	.....	.....	.....	.....	.....	November 25, 83	25	4	50000
Mt. Pleasant M. Co., Cal.....	.....	.....	150000	1	150000	.....	.....	.....	.....	Dec. 27, 83.....	20	4	90000
Morning Star Con. M. Co., Leadville, Col...	.....	.....	100000	10	1000000	.....	.....	.....	.....	Nov. 22, 83.....	25	19	715000
Napa Con. Quicksilver, M. Co., Cal.....	1 50	150000	100000	7	700000	not assessable..	.....	.....	.....	November 1, 83	20	30	310000
Navajo Mining Co., Tuscarora, Nevada.....	2 45	245000	100000	100	10000000	March 7, 82.....	.....	10	255000	May 14, 83.....	25	9	225000
*New York Hill Gold Mining Co., Cal.....	.....	.....	50000	100	5000000	March 26, 78.....	20	6	55000	August 10, 82.....	10	21	215000
Northern Belle Milling & Mining Co., Nev..	47	23500	50000	100	5000000	.....	.....	.....	.....	April 16, 83.....	50	71	2512500
*North Bloomfield Gold M. Co., Cal.....	.....	.....	45000	100	4500000	June 23, 81.....	.....	.....	1590000	November 5, 80	1 00	16	225000
Ontario Mining Co., Utah.....	30 00	4500000	150000	100	15000000	.....	.....	.....	None.....	Dec. 31, 83.....	50	90	5150000
Osceola Con. Copper M. Co., Calumet Dis. Mich	17 00	850000	50000	25	1250000	.....	.....	.....	.....	Jan. 1, 84.....	50	17	1010000
Original Mining Co., Butte, Montana.....	.....	.....	60000	25	1500000	not assessable..	.....	.....	.....	Jan. 3, 84.....	05	29	87000
Oxford Gold Mining Co., Nova Scotia.....	.....	.....	100000	.....	.....	.....	.....	.....	.....	August 25, 83.....	.....	6	30000
Pleasant Valley Mining Co., Cal.....	.....	.....	100000	100	10000000	Sept. 8, 83.....	15	2	30000	Dec. 15, 82.....	05	6	30000
Plumas Eureka Gold Mining Co., Cal.....	7 50	304687	40625	.....	1406250	.....	.....	.....	.....	October 12, 83.....	50	.....	1617175
Plymouth Con. M. Co., Cal.....	.....	.....	100000	.....	.....	.....	.....	.....	.....	Jan. 2, 84.....	50	8	400000
Prussian Mining and Milling Co., Col.....	.....	.....	150000	10	1500000	.....	.....	.....	.....	Jan. 15, 83.....	10	10	132000
Quincy Copper Mining Co., Michigan.....	47 00	1880000	40000	25	1000000	.....	15 00	.....	200000	August 15, 83.....	3 50	30	3610000
Richmond Con. Silver M. Co., Nevada.....	†25 00	1350000	54000	25	1350000	.....	.....	.....	.....	August 10, 83.....	1 25	36	3974887
Robinson Con. Mining Co., Leadville, Col...	23	46000	200000	50	10000000	.....	.....	.....	.....	Nov. 15, 81.....	25	11	700000
San Francisco Copper M. Co., Cal.....	.....	.....	50000	.....	.....	.....	.....	.....	.....	Feb. 20, 83.....	05	11	27500
Sierra Buttes Gold M. Co., Cal.....	7 50	168750	22500	10	225000	paid up.....	.....	.....	.....	October 12, 83.....	25	.....	1344975
Sierra Grande M. Co., New Mexico.....	60	240000	400000	.....	.....	.....	.....	.....	.....	October 2, 83.....	25	7	700000
Silver King Mining Co., Arizona.....	.....	.....	100000	100	10000000	.....	.....	.....	.....	Dec. 15, 83.....	25	43	1300000
Silver King Mining Co., Colorado.....	.....	.....	500000	2	1000000	not assessable..	.....	.....	.....	Aug. 19, 81.....	10	1	50000
Standard Con. Mining Co., California.....	5 50	550000	100000	100	10000000	.....	.....	.....	.....	Jan. 12, 84.....	25	78	4400000
*Silver Cord Silver M. Co., Colorado.....	.....	.....	500000	10	5000000	.....	.....	.....	.....	Nov. 1, 83.....	10	3	225000
St. Joseph Lead Co., Missouri.....	.....	.....	100000	10	1000000	.....	.....	.....	.....	Dec. 20, 82.....	20	22	390000
Straggler Con. M. Co., Colorado.....	.....	.....	60000	.....	.....	.....	.....	.....	.....	August, 83.....	20	10	66700
Socorro M. & M. Co., New Mexico.....	.....	.....	2500	100	250000	.....	.....	.....	.....	March 15, 82.....	1	2	4000
Tip-Top S. M. Co., Black Canyon, Yavapai Co.	.....	.....	100000	100	10000000	August 16, 83.....	25	7	245000	Nov. 27, 81.....	20	5	100000
Tombstone Mill & Mining Co., Arizona.....	70	350000	500000	25	12500000	.....	.....	.....	.....	April 15, 82.....	10	25	1250000
Total Wreck M. Co., Arizona.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	May, 83.....	.....	1	50000
United Gregory M. Co., Gilpin Co., Col.....	.....	.....	300000	1	300000	.....	.....	.....	.....	April 1, 83.....	04	3	38250
Vizina Con. M. Co., Tombstone Dist. Ariz..	.....	.....	200000	25	5000000	.....	.....	.....	.....	April 1, 82.....	10	7	140000

*Shares not in market. †Latest London quotations. ‡Price bid. §The Deadwood has previously paid \$275,000 in eleven dividends, and the Terr \$75,000. Only paid on 450,000 shares. ¶This company as the western up to Dec. 10, 1881, paid \$1,475,000.

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S $\frac{1}{2}$ " 2, " 11th "	
S $\frac{1}{2}$ " 12, " 11th "	
S $\frac{1}{2}$ " 13, " 11th "	
Lot " 1, " 12th "	

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**NOTICE TO CONTRACTORS.**

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undersigned and endorsed "Tender for
Mispeck Works," will be received until
TUESDAY, the 1st day of FEBRUARY next,
inclusively, for the construction of a

BREAKWATER

AT

MISPECK, ST. JOHN COUNTY, N.B.,

according to a plan and specification to be
seen at the office of the Department, Custom
House Building, Saint John, N.B., where
forms of tender can be obtained.

Persons tendering are notified that tenders
will not be considered unless made on the
printed forms supplied, the blanks properly
filled in, and signed with their actual signa-
tures.

Each tender must be accompanied by an
accepted bank cheque, made payable to the
order of the Honorable the Minister of Public
Works, equal to five per cent. of the amount of
the tender, which will be forfeited if the
party declines to enter into a contract when
called on to do so, or if he fail to complete the
work contracted for. If the tender be not ac-
cepted the cheque will be returned.

The Department will not be bound to accept
the lowest or any tender.

By order,

F. H. ENNIS,
Secretary.

Department of Public Works,
Ottawa, 5th Jan., 1884.

**NOTICE TO CONTRACTORS.**

SEALED TENDERS addressed to the un-
dersigned, and endorsed "Tender for
Additional Cell Wing, Boiler House, &c.,
Manitoba Penitentiary," will be received at
this office until MONDAY, the 17th March
next, inclusively, for the erection and com-
pletion of

ADDITIONAL CELL WING, BOILER HOUSE,
&c., AT

Manitoba Penitentiary.

Plans and specifications can be seen at the
Department of Public Works, Ottawa, and
at the Dominion Public Works Office, Winni-
peg, Manitoba, on and after MONDAY, the
11th February next.

Persons tendering are notified that tenders
will not be considered unless made on the
printed forms supplied, and signed with their
actual signatures.

Each tender must be accompanied by an
accepted bank cheque, made payable to the
order of the Honorable the Minister of
Public Works, equal to five per cent. of the
amount of the tender, which will be forfeited
if the party declines to enter into a contract
when called on to do so, or if he fail to com-
plete the work contracted for. If the tender
be not accepted the cheque will be returned.

The Department does not bind itself to ac-
cept the lowest or any tender.

By order,

F. H. ENNIS,
Secretary.

Department of Public Works,
Ottawa, Jan. 9th 1884.

**Graving Dock.**

British Columbia.

SEALED TENDERS addressed to the un-
dersigned, and endorsed "Tender for
Graving Dock, B.C.," will be received at this
office until FRIDAY, the 8th day of February,
1884, inclusively, for the construction and
completion of the partially finished

**Graving Dock at Esquimalt Har-
bor, British Columbia,**

According to plans and specification to be
seen on and after Monday, the 24th December
next, at the Department of Public Works,
Ottawa, and on application to the Hon. J. W.
Trutch, Victoria, B.C.

Persons tendering are notified that tenders
will not be considered unless made on the
printed forms supplied and prices affixed to
the whole of the items stated therein, and
signed with their actual signatures.

Each tender must be accompanied by an
accepted bank cheque for the sum of \$7,500,
made payable to the order of the Honorable
the Minister of Public Works which will be
forfeited if the party declines to enter into con-
tract when called upon to do so, or if he fail
to complete the work contracted for. If the
tender be not accepted the cheque will be re-
turned.

This Department will not be bound to ac-
cept the lowest or any tender.

By order,

F. H. ENNIS,
Secretary.

Department of Public Works,
Ottawa, 12th Nov., 1883.



ESQUIMALT GRAVING DOCK,
British Columbia.

The time for inspection of plans and speci-
fications for the completion of the Graving
Dock at Esquimalt, British Columbia, is
extended to Thursday, the 17th day of Janu-
ary next, inclusively, and for receiving
Tenders to Friday the 27th day of February.

By order,

F. H. ENNIS,
Secretary.

Department of Public Works,
Ottawa, 20th Dec., 1883.

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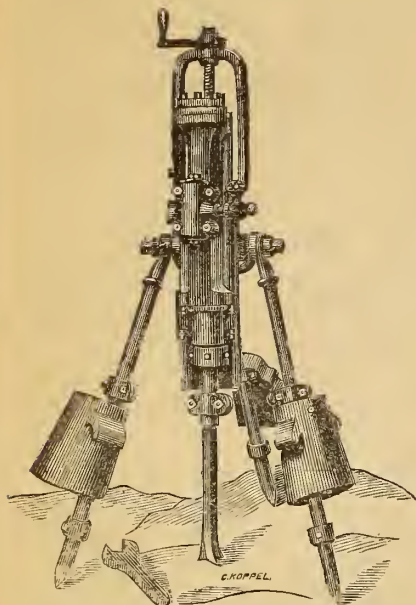
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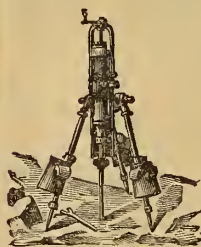
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S $\frac{1}{2}$ and N. E $\frac{1}{4}$	15	16	23	480
E $\frac{1}{2}$ of N. W $\frac{1}{4}$	15	16	23	80
S $\frac{1}{2}$	3	17	23	320
N $\frac{1}{2}$	9	15	23	320
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CANADIAN MINING REVIEW

VOL. 2.—No. 2.

1884—OTTAWA, FEBRUARY—1884

VOL. 2.—No. 2

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OFFICE :

UNION CHAMBERS, 14 Metcalfe Street.

The CANADIAN MINING REVIEW is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts as well as others interested in Canadian Mineral Lands are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 5th of the month it is to appear.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

NEW BOOK FOR MINERS.

We understand that a new book, written by Professor Bell, Assistant Director of the Geological Survey, will be issued shortly, on the Mineral Resources of Canada, comprising an account of the Economic Geology of the Dominion and of the progress of mining for the last twenty years. Such a work will supply a long felt want, and no one is better qualified than the author to do justice to the subject.

During the past month inactivity has, to a certain extent, characterized the mining industry in the Dominion, and there has been nothing of much importance to report from the mining centres. In another column will be found extracts from the President's report to the shareholders of the Oxford Gold Mine, Lake Catcha District, N.S., at the first annual meeting of the Company. We learn that many of the gold mines in the Province of Nova Scotia are being profitably worked, and at others development work is being vigorously pushed with satisfactory results. The gold mines of Beauce, in the Province of Quebec, are attracting the attention of capitalists on account of the flattering reports that have been made of the result of last summer's operations, and in the Eastern Townships, County of Megantic, the Asbestos mines have increased in value, owing to the rapidly increasing demand for the mineral. In Ottawa County there is probably more activity displayed at the phosphate mines than in any other mining district of the Dominion, and the demand for phosphate lands is greater than it ever has been known to be, but it is not probable that any sales of undeveloped properties will take place until the snow leaves the ground. In Burgess Township, Province of Ontario, a good force of men are employed at Mr. Allan's mica mine, and a quantity of mica of very fine quality has been shipped. The iron mining industry of Central Ontario is on the boom, and the reciprocity movement, inaugurated by gentlemen across the border, to have coal and iron

ores included in the free list is occupying the attention of the proper authorities in the United States and Canada, and it will doubtless be a question for discussion for some time before a decision will be arrived at. During the past month we have received no reports of progress at the Canadian mines on Lake Superior and at the Lake of the Woods gold mines. The Huronian and Rabbitt Mountain mines are said to be steadily improving as the work of development proceeds. In the Rocky Mountain District mining was almost entirely suspended when the winter set in, but it is expected that operations will be vigorously resumed with the opening of spring. From British Columbia some interesting news has quite recently reached us and is reported in another column.

We are informed that the revised Regulations to govern the disposal of Mineral lands, other than Coal lands, in the Province of Manitoba and the North West Territories have been definitely framed and are at present in the hands of the Minister of the Interior preparatory to being submitted to the Government for adoption—after which it is required that they be on the table of the House for thirty days before becoming law. It is to be hoped that after these Regulations will have been adopted it will not be discovered that they contain impracticable clauses, and still more is it to be hoped that the interests of the prospector have been carefully considered and protected. The important part they play in the opening up of every mineral

district should never be lost sight of by those in whose power it lies to protect and encourage them.

SOLID INDUSTRY.

As so many and important discoveries of economic mineral deposits have been reported by the army of prospectors who are now distributed over the length and breadth of the Dominion of Canada, it becomes the duty of those who desire that these discoveries be made valuable to use every legitimate argument that will invite capital to the country for developing them, and then to be scrupulously careful in seeing that whatever capital may be forthcoming for this purpose will be employed in such a manner as will encourage the investor and convince him that mining operations are not unprofitable. This being the case it is not inopportune to reprint an article which has appeared in the *Chicago Mining Review* under the above heading, as follows :

"While it is certain that no enterprise in which men engage can show more certain and tangible proof of profitable permanence than the mining industry, it is probably true that no avocation is at the present time regarded with so much uncertainty and suspicion as far as a reliable and certain reward is concerned. While the mining field and the product of mining development is the very symbol of solidity and permanence, and all operations connected with it can be definitely estimated and determined, the actual results have not been such as to give to this business a reliable character to which it is entitled. But this reputation we are certain comes more from unfavorable circumstances and lack of judgment and knowledge, on the part of those who have attempted to prosecute this work, than from any possible obstacle or want of value on the part of the mines

or the mineral resources themselves. As a rule mining operations have generally been attempted at such a distance from the source of supplies and the market for ores, that the transportation has been in many cases greater than the value of the ores in the market centres. Under these circumstances no profitable results can be expected, and one mistake has been in expecting immediate results from operations in this direction. No sane man would open up and place in order for production a tract of agricultural land at such a distance from the market and points of consumption that the cost of transportation would be more than the value of the grain when it reached the market, and it is just as absurd to expect profit from mining operations under similar circumstances. All that can really be reasonably demanded from operations in a large proportion of the mining camps at present is development so that the mines may be ready to produce ore when milling, market, transportation and other facilities are available. The fact that under all these adverse circumstances mining operations have been able to show such a favorable result upon the whole, is a most conclusive proof of their magnificent value, when circumstances and conditions are favorable to their legitimate operation and prosecution. We must protest against the common verdict which is rendered against mining, when the true facts connected with its development in the direction of legitimate production are not taken into consideration."

THE PHOSPHATE MINES OF OTTAWA COUNTY.

After a visit to the mines in the near vicinity of the Riviere du Lievre, one cannot fail to be impressed with the belief that phosphate mining is a very profitable industry. For eighteen miles from the village of Buckingham, along the ice road on the river, can be seen a moving stream of teams hauling mineral to the C. P. R. Depot for shipment, and the thousands of tons that have already been delivered there present an interesting sight. Owing to the difficulty of forwarding the ore to point of shipment during the summer it is allowed to accumulate for winter transportation, and at present there are not less than

two hundred and fifty teams continually engaged hauling from the different mines. The road on the ice is, and has been all winter, in excellent condition for this purpose, and the mine-owners are confident they will continue so for a sufficient length of time to enable them to forward all their output to the railway without increasing the carrying force. The mines are turning out phosphate in large quantities, and the average cost of mining, in the du Lievre district, will not exceed \$5 per ton when dressed and ready for shipping. Mining operations are being conducted at present with better system than heretofore, and to an observer the scene at the mines is one of unusual activity.

THE MINES.

"HIGH ROCK."—Eighty men are employed at this mine and about twenty tons of mineral is estimated to be the daily output. The manager reports that he will deliver 5,000 tons at Railway Depot before the winter roads break up.

THE "UNION" gives employment to 60 miners and the daily output is not less than 20 tons. There has already been forwarded 2,400 tons of very fine mineral, with more to follow. At this mine there are in use steam hoists and drills and other modern machinery, and the buildings on the property are most complete in every respect. Captain Smith, manager for the Union Phosphate Company, deserves much credit for the manner in which he has equipped this property.

"NORTH STAR."—This mine is looking well, in fact better than at any former period. A force of sixty men produce 12 tons daily, and if the property continues to improve as it has done during the past month the daily output will much increase. Seven hundred tons of phosphate have been delivered at the railway depot and 400 tons are mined and awaiting transportation.

THE "WATT," now known as the Little Rapids Mine, has not been worked for ore since Mr. Allan purchased it in the winter, but, preparatory to organizing for active operations in the spring, a small force is employed opening a new deposit which is developing well and adds greatly to the value of the property. The quality of the mineral at this mine is unequalled at any phosphate mine in Canada.

THE "EMERALD" employs 56 men who raise 20 tons daily, and 2,000 tons of fine mineral, now mined and dressed, will be forwarded to point of shipment this winter. A drift has been run from the face of the mountain for 63 ft. in the direction of the main pit, and an-

other for 31 ft. from the pit towards it, which leaves 20 ft. of drifting to be done before they join. When this has been accomplished work will go ahead more rapidly. The phosphate that is being taken from this mine is very clean and pure.

The property adjoining the "Emerald," known as the Fitzgerald Mine, has been purchased by the Dominion Phosphate Company, and mining operations will begin as early as practicable in the spring under the superintendence of Mr. W. H. Smith, the Company's manager at their North Star mine.

In the Township of Templeton the "McLaurin" and the "Post" mines are turning out ore plentifully and the property being worked by Laurie & Co. is developing well.

In Wakefield the "Haldane," the "Gemmil" and the "Moore" mines have been improving for some time past and have developed into very valuable properties. From each of these mines a fairly large quantity of fine mineral will be forwarded for summer shipment, aggregating from 1,000 to 1,200 tons.

Phosphate Quotations.

The latest quotations received from abroad show no variation from last month's report, the ruling price being 1s. 3d. per unit for 80 per cent. mineral on wharf at Liverpool and other points. No recent sales have been reported that would establish a price to govern the season's transactions.

Navigation of the Riviere du Lievre.

It has at last been definitely settled that the much needed improvements at the Little Rapids are to be made, and work will be begun as soon as the ice will have left the river. A petition, signed by a large number of the prominent lumbermen and phosphate miners of the Du Lievre district, was forwarded to the Minister of Public Works praying that a Lock should be built at the Little Rapids, and that the same should be so constructed as to raise the water above the lock sufficiently to make the river navigable as far as High Falls. Subsequently Mr. Alonzo Wright, M.P., in company with Mr. Andrew Holland of this city, representing the petitioners, called upon Sir Hector Langevin who promised them positively that the necessary improvements would be begun in the spring and energetically pushed to completion. An appropriation (\$6,000) is included in the estimates for this purpose, and there now exists no doubt that the day is not far distant when steamers of useful capacity will ply between Buckingham village and High Falls.

Too much credit cannot be given to the popular member for Ottawa County for the deep interest he has always evinced in matters affecting

the requirements of his constituency, and in this instance the granting of the petition has been due to his prompt and earnest action.

It is gratifying to know that the articles which appeared in *Review* directing attention to the necessity of the improvements above referred to, have not been disregarded. Other improvements, strongly urged in its columns, to facilitate the transportation of phosphate from the landing at the Village of Buckingham to the C. P. Ry., will be carried into effect early in spring, arrangements having been completed, we understand, to repair and macadamize the road between these points by private enterprise. This will overcome a most obnoxious hindrance which the phosphate miners have had to contend against since the industry was first started in the district.

OXFORD GOLD MINE.

The report of Mr. M. F. Hunt, President of the Oxford Gold Mining Company, of Lake Catcha District, Nova Scotia, dated New York, 15th December, 1883, addressed to the stockholders, at the Company's first annual meeting, could not fail to have been received by them with unqualified satisfaction. The President after describing the property known as the Oxford Gold Mine, composed of 63 mining areas, proceeds to carefully review the Company's operations from the time of its organization up to December 1st, 1883, and to point out what has been accomplished on the properties since the beginning of actual mining operations in March 1882, and shows that such operations have resulted in producing an output of 2,177 tons of milled ore, yielding an average of \$29.82 per ton, representing a bullion product of \$64,934.81 received in New York from August 9th, 1882, to November 30th, 1883. Attached to the report is the financial statement showing the total receipts from the product of the mine to have reached the handsome sum of \$65,735.55, and the disbursements, for actual operating expenses, to have amounted to but \$30,266.91, in addition to which a large amount is shown to have been expended on plant and \$27,125 paid in dividends.

Since the President's report was published we have learned that the bullion product for the month of December amounted to \$4,380.10, and on December 31st dividend No. 10 was paid, amounting to \$2,875; making a total of \$30,000 paid in dividends during 1883.

Such flattering representations as those we have quoted cannot but lead to the conclusion that the Oxford Gold Mining Company is in a flourishing industrial condition. This state of affairs is not more attributable to any extraordinary richness or extent of the different

lodes on the properties than to careful management and a thorough knowledge of mining on the part of those under whose immediate supervision the operations at the mine have been conducted.

There are many mining companies in Canada at the present time owning valuable properties and carrying on operations at a heavy loss to the shareholders owing to deplorable mismanagement. Such properties might become sources of large revenue if those having control would see that mining operations were prosecuted on scientific principles and would study economy and good management. If such a system could be inaugurated it would, beyond a doubt, give an impetus to, and effectually ensure prosperity for, our mining industries at large, as it has done in the case of the Oxford Gold Mining Company.

ASBESTOS MINES OF THE EASTERN TOWNSHIPS.

The rapidly increasing demand for the mineral has become a forcible incentive to the owners of asbestos properties to develop the deposits, in order that they may avail themselves of the present advanced price that is being offered by manufacturers in the United States and abroad. An almost unlimited quantity of asbestos of very fine quality is distributed throughout the serpentine belt, traversing a portion of the County of Megantic, which appears to attain its greatest prominence in the Townships of Thetford and Coleraine. In the Township of Broughton, as well, some valuable deposits have been worked to some extent. At the Boston Asbestos Packing Company's Mine, in the first named township, about 70 men are employed; a depth of 75 or 80 feet has been reached, covering a large area, and the daily output averages 2 tons. The "Johnson," "King" and "Ward" mines, also in the Township of Thetford, are being actively worked, and when the snow will have disappeared in the spring, it is not improbable that mining operations will be begun on the Read property in the Township of Coleraine. Some New York capitalists, have, within the past few days, purchased a location in the Township of Broughton from which a fair quantity of mineral has already been shipped, and owing to its superior quality the owner received the highest price for the shipment that has been paid for many years. A firm of Turin, Italy, has recently made a bid for a portion of the output of this district, but as the American manufacturers are offering a much higher figure—about \$25 per ton more—the Italians are not likely to be supplied at present from Canadian mines. New uses, to which this mineral can be applied, are being almost daily discovered in various

quarters of the globe. Its value will increase correspondingly with the demand, and the outlook for owners of asbestos mines in the above named district was never brighter than at the present time.

MICA.

Latest reports from Mr. Allan's mica mine in Burgess are of a very satisfactory nature. As lower level is reached in the different shafts that are being sunk the crystals increase in size and number and the quality steadily improves. A fair force of miners are employed, and, although it was but a few weeks ago that work was started, a considerable quantity of high grade mica, very clear and cut into sheets running as large as 10x6, has been already shipped to dealers in the United States and Canada.

Mr. Allan has just completed the purchase of another mica property in the County of Ottawa, and will begin work just so soon as the snow disappears. Samples of the mica received are very white and clear, and of good size.

ALMANDITE.

An extensive deposit of this mineral, which is a variety of Garnet, has recently been discovered in the Township of Rawdon, Province of Quebec, and has become the property of some enterprising gentlemen identified with the mining industry of Canada. The owners purpose opening up their property without loss of time, and are already in negotiation with New York parties for the sale of their output.

This garnet rock is extensively used as a substitute for emery, being almost equal to it in hardness, and is a valuable mineral. The present sources of supply are the States of North Carolina and Georgia where the few deposits that have been discovered are said to be very profitably worked. It is supposed that the emery mines in Asia are working out, and if this be so, it is only a question of time when such substances as garnet and sapphire stone, etc., will be almost exclusively used as a substitute. It is therefore a source of gratification to learn that deposits of this mineral have been found to exist in Canada in workable quantity.

THE HAYCOCK IRON MINE.

Since the last number of the REVIEW was published, earnest enquiry as to the cause of delay in the negotiations in England for the transfer of this property has failed to elicit any information beyond the fact that there is a hitch, the nature of which, however, has not yet been ascertained. It is to be hoped that nothing has occurred to alter what had appeared to be a positive decision on the part of the English company

to accept the terms upon which the property was offered to them. It is a great pity that this mine and the company's plant should continue in its present deserted state year after year and, at a time when the public were led to expect early resumption of operations, mysterious delays, or, for aught they know, definite abandonment of negotiations, are very disappointing.

A Fatal Mistake. (Wall Street News.)

The president of a New Mexico mining company—headquarters in Boston—entered his office the other day to find everything and everybody in a hubbub, and his demand to know the cause was replied to with:

"Our mine has been turning out ore."
"No!"
"It's so! Here's a telegram announcing that we have actually struck it rich!"

"Great Scots!" gasped the president, as he sank back into a chair. "What did those idiots want to go and discover ore for just as we had got ready to levy an assessment of \$2 per share to dig a three-mile tunnel to drain our hole. Why, stockholders will be kicking like steers in less'n a week."

MINING NOTES.

GOLD MINING.

Mr. Allan of this city and Mr. Humphrey of Quebec are sinking a shaft on the old bed of a river near St. George East, Beauce County. The shaft is now down about 135 feet and properly timbered. Bed rock has not yet been struck, but pay dirt has shown itself, and it is safe to predict that when a 10 ft. lower level has been reached the richness of the dirt will have much increased, and the value of the property will be established.

It is stated that an American Company has purchased a portion of the Canada Gold Mining Company's property in Beauce, and will organize at once for early mining operations.

The Barker claim in Cariboo District, B.C., continues on good paying ground. On January 22nd a wash-up for two day's work produced 62 ounces. On 26th, another wash-up gave 102 oz., making a total for one week of 164 ounces, and ground continuing good paying. The work of the week previous produced 90 ounces and as much as \$6 to one pan was washed up. It is stated that on other claims down the creek miners have commenced taking out pay.

News from Cassair, B. C., states that at the gold mines at McDame's Creek the snow is 17 feet deep, and that in November the thermometer registered 40° below zero. There are 80 men at the mines—whites and Chinamen—and on account of the severe cold the latter were obliged to tuck in their shirts. *Fools if they didn't.*

In the Halifax *New Era* it is stated that the Bridgewater gold mines are improving very rapidly, the richest lode, giving about 11 oz. to the ton, increased from 8 inches in thickness to 15 inches, and in going down 80 ft. shows the same ore all through.

A report of progress in operations at the Canada Consolidated Gold Mining Company's property, in Hastings County, Province of Ontario, will be gratefully received.—[Ed.]

PRODUCTION OF GOLD.

The returns thus far received by the Director of the mint indicate that during 1883, the production of gold in the United States amounted to \$30,000,000.

Mining in Canada—Sulphur Ores and Phosphate.

(From the N. Y. Engineering and Mining Journal.)

Time works marvels in the lives and interests of individual citizens, but much more so in the history of manufactures and of states. We live on the eve of great changes, and the wisest among us, not blinded by political bias, can see that the probable reform of the tariff in the near future must bring with it certain radical alterations in our manufactures and commerce. Whether serious changes in the trade of the two countries occur or not, there are raw materials in Canada which are now valuable, and will speedily become more so as our consumption of sulphuric acid and fertilizers increases. Except coal, sulphur ores, and phosphates, the minerals of Canada possess but little interest for the American investor. Now and then, he may meet with something worth notice in other directions, but not often. In the case of sulphur ores and phosphate, it is not so; for outside of our Carolina supplies of phosphate, there is none so near or so rich as the apatite of Canada, while our available sulphur ores are widely distributed.

It is not many years ago since Canada phosphate began to attract notice in the United States and Europe. Of late years, Americans have kept a steady lookout for property in Canada which they could work themselves for the requirements of their own factories. The importance of the fertilizer trade in its present condition, and the proportions it promises to assume in the near future, are the principal causes of this diversion of interest. It is not many years ago that the home manufacture was expressed in five figures; now it takes seven. This change has

been accomplished in the short space of ten years. What it will be in the next decade will depend mainly on the supply of the raw material, and especially on the cost of the sulphuric acid. When Canada apatite first came on the market, some eight years ago, practical men shook their heads at the hard and unpromising looking material. Many of the mills then in use in fertilizer-works were the buhrstones used to pulverize coprolite and other comparatively soft material. The difficulty of grinding has now been overcome, and it is no longer a source of danger to workmen and of perplexity to manufacturers. Instead of using it as they did coprolite, it is mixed largely with other softer materials, which enables the operating chemist to first saturate the apatite with sulphuric acid, and use Carolina phosphate or bone-ash as a drier. The use of these materials assists largely in lengthening the chemical action of decomposition; the carbonic acid of the softer materials offers a mechanical agent to sustain the acid in its attack on the hard and crystalline apatite. Up to the close of June, 1881, the total export of Canada phosphate was 15,600 tons, the average value of which was about \$16 a ton. In 1882, these figures were increased to 18,000 tons, which commanded a higher average of value. Last year, the amount was 23,000 tons, and a slightly increased value over the year previous. Being a more concentrated phosphate than any other in the world, it has very naturally been sought for to bring up the acid phosphate fertilizer to high percentages of phosphoric acid. A statement of the analytical composition of a few of the leading phosphates of commerce will indicate the high value of Canadian apatite:

Raw phosphates.	Content of tri-basic phosphate of lime. Per cent.
Russian :	
Government of Orel.....	29.14
Government of Podolia.....	66.78
English :	
Cambridge coprolite	57.78
French :	
Ardennes coprolite	45.21
Bordeaux phosphate	77.41
Spanish :	
From two mines, from.....	74.85
West Indian :	
Navassa Island	72.43
Old Curacao Island	70.99
New Curacao Island	88.80
Sombrero	81.88
Redonda	87.73
Elroque	69.86
Rio Grande :	
Bone-ash	70.80
South Carolina :	
Coprolite	48.60
Phosphate	51.61
Canada :	
Apatite.....	72.94

Those who have secured properties in the Ottawa District have worked them most energetically for all they are worth, and their returns have been very encouraging so far. The expenses vary of course with the conditions; but as a rule, range from four to five dollars per ton, often less, sometimes a little more. These figures are, however, the result of the experience of a number of workings, embracing, at least, several large mines in the great Ottawa District. The cost of the mineral laid down in Montreal may be estimated at from \$7 to \$9 per ton. Freights to New York may be had at from \$3 up by boat, and for long contracts easy railroad rates may be secured directly from the mine to destination. Prices this season in Montreal have ranged from \$18 to \$22 for choice shipments.

The quantity of this material which our market can deal with will depend mainly on the cost of our sulphuric acid. Already a great change has recently taken place in the plant of several American manufacturers and acid has occasionally touched very low figures. Among manufacturers of acid, opinion has changed in regard to the economy of pyrites over brimstone. Some of the best known pyrites contain in average samples about as follows:

	Virginia.	Capelton, Canada.	San Domingo.	Spanish.
Sulphur ..	47.50	46.60	49.00	46.00
Iron.....	44.00	45.00	43.50	43.50
Copper.....	2.60	4.10	3.20	3.10

Hitherto, the extraction of copper was the basis of operations at Capelton, and the sulphur was allowed to diffuse itself as dioxide (SO₂) for miles around, injuring vegetation and otherwise damaging property. If the process were reversed, and the ores were worked for their sulphur, the by-product would become a snug little profit, as it is in Europe. The

Capelton District could supply a very large demand for sulphur for some time to come, and its ores could be worked either in the immediate locality, or at some other point more convenient for coal and distribution of the raw material.

It is an immense economy to erect fertilizer-works alongside the acid chambers, as it saves the cost of concentrating the acid required for superphosphate manufacture. As is known to practical men, the acid is used at chamber strength of 1.20 sp. gr. As the competition in the manufacture of fertilizers increases, it will become necessary for almost every maker to manufacture his own acid, to secure his full share of profit. Inability to supply one's self with acid of home make has knocked many a British manufacturer out of the market in his own country. The conditions of a trade do not always remain the same; and if American manufacturers have been able to make a decent profit on well made fertilizers, it is because the amount of capital in the business was not so large that competition became ruinous. As capital increases and the consumption of fertilizers becomes more general, competition will be keener, and every source of economy, whether it promises much or little, will be squeezed to yield its best results. A few years ago, a prominent statistician gave the consumption of fertilizers for a few of the Southern States, which ran somewhat as follows:—

State.	Acres.	Fertilizers in tons per year.
Georgia.....	6,000,000	100,000
North Carolina.....	4,663,000	80,000
Virginia.....	3,500,000	40,000

If the other States could be added, it would soon be found how large is the consumption of manufactured fertilizers. If the home work be taken at twelve hundred thousand tons, then fully a half million tons of sulphuric acid would be required to treat the raw material producing the manufactured articles and subsidiary purposes. The large deposits met with between New York and Montreal might be used to satisfy the entire wants of this business. Whether any changes are made in the tariff or not, Americans would not be prevented from drawing supplies of sulphur from Canada. Should any alteration be made in the direction of free importation of sulphuric acid, then new circumstances may arise which may render it desirable to make the acid where the raw materials are found. Those found in Canada are likely to receive an increased share of attention from year to year, both because of their proximity and high value.

Those who have watched the quiet revolution which has taken place in the flour milling trade during the last five years, must have noticed not merely the rapid reduction of the buhrstones and the substitution of rollers; but the very large increase of capital, which has been attracted to the business. Important as flour milling is to a country, and the adoption of the new methods, so rapid a change was not more needed in the miller's trade than it is in the manufacture of acids. If ever the United States becomes great as a manufacturing nation, it will be largely the result of cheapened sulphuric acid. So manifold are its uses apart from the fertilizing trade, that one can scarcely think of an industry which can be carried on without its aid in some one or other of its operations. Cheap acid is the basis of all chemical industry, and to be in the front rank as a manufacturing nation has long been the wish and aspiration of the country. For several years, railroad activity has not been less than it is now. There is less competition for money for this purpose than there has been for some time. Taken up by manufacturers, there is less likelihood of such a scheme falling through after a flush of excitement. With the steady growth in the fertilizer trade, and the lessened demand for capital out west for the next few years, there will undoubtedly be a larger share of it for employment east. If the home proportion of the manufacture is to increase, acid must be as cheap here as it is in Europe. The quantity of acid a country consumes is often assumed as a test of progress in the manufacturing arts and of its position in the commerce of the world. The consumption is determined by the cost of the article, and this again may be governed by the people themselves. Not consumption only, but the amount which a country can manufacture, may also be rightly regarded as a proof of its civilization.

J. C.

The author of the foregoing intelligently written article has made one or two incorrect statements to which attention should be directed. In giving the percentage of tribasic phosphate of lime, contained in the raw phosphate of various parts of the world, he credits Canada apatite with but 72.94 per cent. whereas it actually contains 89.91 per cent. tribasic phosphate of lime according to the most authentic analysis that we have on record, made from hand picked sample selected from the heap as being the most free from admixture with foreign mineral matter. Cargo samples, analyzed in England, have returned 85 to 86 per cent. for shipments from certain Canadian mines, which result has been attributable to the careful cobbing of the mineral.

Again the amount of apatite shipped from Canada during last year aggregated but 17,840 tons instead of 23,000 tons as stated. The annual output of the Canadian phosphate mines during the past six years has been as follows:—1878, 3,701 tons; 1879, 11,927 tons; 1880, 7,974 tons; 1881, 15,601 tons; 1882, 17,181 tons; 1883, 17,840 tons, and it is not unreasonable to expect that the output for the present year will reach quite 24,000, probably 25,000 tons.—[Ed.]

The Reciprocity Movement by United States Citizens with Canada on Coal and Iron Ore.

The Association for Reciprocity in Coal and Iron Ore held its second meeting at the Windsor Hotel, N.Y., the afternoon of January 24th. The association was formed at the Fifth Avenue Hotel on January 3rd, to secure, if possible, a reciprocity treaty between Canada and the United States, by which coal and iron ore would be placed upon the free lists of the two countries. E. N. Frisbie, of New York, was elected President; W. C. Andrews, Treasurer; and C. J. Pusey, Secretary. Gentlemen were present representing the coal and iron interests of Cleveland, Youngstown, Toledo, and other points. A committee was appointed which, with one from the Board of Trade of Montreal, came to Ottawa, and on Saturday, 19th January, held a conference with Sir Leonard Tilley, Minister of Finance, and the Hon. Mr. Bowell, Minister of Customs. In their report to the association at the meeting on the 24th January, the committee stated that it found the Canadian Ministers anxious to have lumber and salt included in the proposed treaty, but the New York committee was not prepared to give any encouragement on that point. The committee had every reason to believe that the Dominion Government was very favorably disposed to the proposed treaty, and that, if Congress should place Canadian iron ore and coal on the free list, the Dominion Cabinet would exercise the power vested in it and place the same products of the United States on a similar list. A committee headed by the Hon. Galusha A. Grow was appointed to press the matter of a treaty at Washington.

Mr. Charles J. Pusey, the secretary of the new organization, has made the following statement concerning its objects:

"A committee, consisting of E. N. Frisbie, James Tillinghast, John Moulton, H. C. Roberts, Samuel Thomas, W. C. Andrews, and Charles J. Pusey, was appointed to visit Ottawa and ascertain the disposition of the Canadian Government toward such a movement. This committee has been at Ottawa, in consultation with the Ministers of Finance and Customs, and was assured by them of the favorable action of the Canadian Cabinet."

"A wrong impression is abroad that this movement originated in Canada. It had its origin in the United States. The fact that a delegation from the Montreal Board of Trade accompanied our committee to Ottawa may explain the mistaken impression. We propose to ask the present Congress to pass an act allowing Canadian coal and iron ore to be entered here free of duty, provided that the Canadian Parliament will also pass a similar act in regard to our iron ore and coal. Efforts will be made to urge immediate action on the part of Congress, and I may say, without mentioning names, that we have several Congressmen pledged to support our movement at the proper time. Should such legislation be obtained as desired, both here and in Canada, the greatest benefit will be ours; for Canada will be giving up revenue to the amount of about \$1,000,000, while the United States will have to give up only about \$250,000 in revenues. The amount of coal imported into Canada from the United States for the year ended June 30th, 1883, is shown here:"

To Provinces.	Anthracite.	Bituminous.	Coke.	Total.
Ontario.....	439,586	736,176	7,267	1,183,029
Quebec.....	208,532	3,869	494	212,895
Nova Scotia.....	19,355	3,618	.....	22,973
New Brunswick.....	43,911	638	.....	44,549
Manitoba.....	13,919	90,628	129	104,676
British Columbia.....	356	373	2	731
Prince Edward Island.....	1,597	43	.....	1,640
	727,256	835,345	7,892	1,570,493

"The amount of coal and iron ore exported from Canada to the United States for the year ended June 30th, 1883, was as follows:

From.	Coal.	Iron ore.
Ontario.....	.....	42,745
Quebec.....	2,120	.....
Nova Scotia.....	110,150	.....
New Brunswick.....	17,670	.....
British Columbia.....	172,863	1,890
	302,803	44,635

"It will be seen that Canada gives up much more at first than the United States does; but Canada looks forward to the development of her

iron mines, whose ores are especially adapted to making Bessemer steel, and in the long run the advantages will undoubtedly balance."

The producers of bituminous coal in Northwestern Pennsylvania, who seek a market in and through Buffalo and Rochester, held a meeting on January 25th, to consider the annual production and to consult with the agents of the railroads leading to these points, as to the freight rates on their products during the year, and as to the general interest of the bituminous coal trade. The meeting was largely attended by prominent gentlemen representing different companies. Hon. Galusha A. Grow was elected chairman, and A. Dowdell secretary. A committee was appointed to report on the annual production of bituminous coal for the Buffalo and Rochester markets and the best method to regulate the output. The following resolution was unanimously adopted, on motion of E. N. Frisbie:—

Resolved, That we are in favor of reciprocity with Canada on coal and iron ore, and we heartily approve of the efforts making by the "Association for Reciprocity on Coal and Iron Ore" to secure the necessary action by the governments of the United States and Canada to obtain such a result.

The committee on coal production reported in favor of appointing a committee representing the railroads and the producers of bituminous coal, which should have power to regulate the annual production.

THE IRON DEPOSITS OF CENTRAL CANADA.

(Continued from Page 5, Vol. 2, No. 1)

Every indication points to the fact that the ore was originally deposited in beds in open cavities and subsequently buried under a mass of material. The series of upheavals, has brought ore to the surface in positions which simulate the form of metallic veins. But they are evidently true beds and of remarkable extent and purity.

A few miles north of Madoc village is a hematite mine from which many thousands of tons of first class ore have already been taken, nearly exhausting the open pit from which the ore has been mined. But the ore passes from this pit under the highway and a shaft sunk on the opposite side of this highway has struck ore of a high grade, while the horizon of the ore can be traced for a long distance by numerous outcrops in both directions. It is probable that this locality will furnish much more ore than has been already mined.

The most important deposits are the magnetic ores found at varying distances north of this mine. The first of these on the line of the Railroad on which any work has been done is

THE EMMA MINE.

This is on lots 6, 7 and 8 of the 19th Concession of Tudor Township where the ore is shown on the slopes and crest of a ridge rising about 180 feet and can be traced by debris of the ore and by the needle for a horizontal distance of some two thousand feet, the needle indicating an ore body from 80 to 100 feet or more in thickness. The upheaval has produced here an anticlinal and on a ridge a little to the south, this mine is duplicated by a body of ore dipping in the opposite direction called the Robinson mine. On the latter a pit has been sunk into the ore which is of excellent quality and appears to be in bed. The thickness here has not

yet been determined. On the highest part of the ridge of the Emma were large angular masses of very pure ore protruding from the surface which were supposed to be in their natural bed, but a cut into the slopes shows that at the time of the upheaval they were torn off from the mass of the ore and elevated above it. Their size proves that they come from a large body and their angular form that they have not been carried far from their parent bed. A careful study of the succession and dip of the strata and the indications of the dipping needle warrant the conclusion that there is here, just below the cut already made into the hill, a body of ore at least about 80 feet thick, and extending a long distance along the ridge. It should be remarked that in all parts of this territory examined, except one, there is a sharp transition from the ore bodies to the including rocks, none of the latter being magnetic, so that the indications of the needle are unusually reliable. A sample of this ore was analyzed by Professor E. J. Chapman, of University College, Toronto, with the following results:

Ferrous oxide.....	28.32
Ferric oxide.....	63.24
Chromic oxide.....	trace
Titanic acid.....	none
Phosphorous.....	trace
Sulphur.....	0.02
Silicious rock matter.....	8.36

Mr. H. M. Curry, of the firm of Carnegie Brothers & Co., of Pittsburgh, also made analyses of specimens taken by him from the mine, with the following results:

	Hard ore.	Soft ore.
Silica.....	5.370	5.080
Iron.....	65.194	65.604
Phosphorous.....	.051	.009
Sulphur.....	None	None

These indicate an ore of unusual excellence, and it may be regarded as certain that in extent the Emma and Robinson combined will take a rank among the largest iron ore mines known.

THE BAKER MINE.

The next in order along the line of the road, and about four miles from the Emily is the Baker mine.

Here glacial action has stripped much of the ore leaving it uncovered along a crescent like ridge, the whole length of which is considerably over one mile. The outcrops are not continuous, and there are breaks in the line of magnetic attraction, so that until further explorations are made, it might be proper to speak of the three Baker mines on their crescentic ridge. Enough is, however, disclosed to prove they contain a very large amount of ore. A horizontal cut has been made in one place through 30 feet of solid ore; and enough can be seen to show that it has a similar thickness in other places. Two analyses of this ore have been made, the first by Professor Chapman of the University College, Toronto, and the second by Mr. H. M. Curry, of the firm of Carnegie Bros. & Co.

No. 1.

Ferrous oxide.....	29.18
Ferric oxide.....	64.95
Titanic acid.....	none
Phosphorous.....	trace
Sulphur.....	0.13
Silicious rock matter.....	5.66

No. 2.

Silica.....	5.500
Phosphorous.....	0.088
Sulphur.....	0.000
Metallic iron.....	66.288

These indicate an ore of remarkable excellence, indications which have been fully sustained by the cut into the solid body of the ore except in one particular. The ore contains much more sulphur than disclosed by these analyses, so much as to render it probable that the bulk of the ore will have to be roasted before it is introduced into the smelting furnace. The great abundance of hardwood on that property and in the immediate neighborhood will make this inexpensive, and as an immense amount of ore can be taken out above drainage, the cost of mining and of roasting will for a long time be less than the cost of mining alone at most mines.

THE COE HILL MINING CO. MINE.

This mine, formerly called the Batchelor mine, is in Wallaston Township, and about 20 miles in a northwest direction from the Baker. It is a double mine on an anticlinal, one part already opened and worked and the location of the other disclosed by the dipping needle. At the mine now opened a cut was originally made into the hill on the level of the space selected for the dump which passes through a horizontal thickness by careful measurement of 68 feet of solid ore, with but slight intrusion of rock matter, the bottom of this cut was from 20 to 25 feet below the top of the ore; and from the bottom a shaft has been sunk in solid ore to the depth of 40 feet. The ore has also been

pierced by the Diamond drill at the depth of 230 feet from the surface, disclosing 70 feet of solid ore. The testimony of all who have examined this property is that, considering the quantity and quality of the ore and the small amount expended in development, no more promising mine has ever been found upon the continent.

The following analyses will indicate the character of the ore:—

BY PROFESSOR CHAPMAN.

Ferrous oxide.....	26.12
Ferric oxide.....	65.20
Titanic acid.....	none
Phosphorous.....	0.02
Sulphur.....	0.07
Silicious rock matter.....	8.48

BY MR. CURRY.

Silica.....	5.770
Phosphorous.....	trace
Sulphur.....	0.238
Metallic iron.....	63.554

SECOND SAMPLE.

Silica.....	8.320
Iron.....	60.611
Phosphorous.....	trace
Sulphur.....	0.440

Mr. Rattle, of the Cleveland Rolling Mill Company, has also made an analysis of a sample from this mine with the following results:—

Iron.....	68.180
Silicon.....	3.200
Sulphur.....	0.000
Titanium.....	0.000
Phosphorous.....	trace

It should be said, in regard to the varying amounts of sulphur shown by the analyses of the ore of the Batchelor mine, that it does contain visible pyrites, but so segregated and separated from the mass of the ore that the great bulk of it can be sorted out in mining; while compared with the mass of the ore, the quantity is so small as not materially to detract from its value.

THE ARTHUR MINE.

This is a new mine in Chandos township about 6 miles southwest of the last, and to which it is proposed to extend the railroad. It illustrates the advantage of that absence of ore in the ordinary rock strata referred to above, making the indications of the dipping needle more than ordinarily reliable. A month ago a careful examination was made of this property. Along a ridge in a dense forest rising steeply to the height of about fifty feet there was a very strong attraction of the needle, the limits of which were clearly defined. The hill was covered with forest trees with a thin covering of soil and the debris of the ordinary wall rocks of the ore of this neighborhood, and some fragments of ore. After a careful investigation the conclusion was reached that the stripping of the hill would disclose a body of ore denuded of the wall rock. This work of stripping has now been carried over the hills from one base to the other for a breadth of about 20 feet. It discloses a verticle

height of 50 feet of solid ore with no indications of sulphur and without any rock covering, the base of the uncovered part having a thickness of about 70 feet. The indications point to a deposit of ore fully equal in quality and in quantity to that in Wallaston.

(To be continued.)

DIVIDENDS DECLARED.

The Quincy Copper Mining Company, of Michigan, will pay a dividend of \$4.50 per share on 20th inst., aggregating \$180,000. Total dividends \$3,790,000.

The Central Copper Mining Company, of Michigan, paid their annual dividend on 1st inst. of \$2.00 a share, aggregating \$40,000. Total of dividends to date, \$1,710,000.

The Atlantic Copper Mining Company, of Michigan, paid a dividend of \$1.00 a share on 1st inst., aggregating \$40,000.

The Hecla Consolidated, of Montreal, has paid dividend No. 2 this year of 50c. a share, aggregating \$15,000 each. Total \$30,000.

The Ontario Silver Mining Company, of Utah, on 31st January, paid a dividend of 50c. a share, aggregating \$75,000. Dividends to date, \$5,225,000.

The Standard Consolidated, of California, on the 12th inst., paid a dividend of 25c. a share, aggregating \$25,000, making \$50,000 already paid this year.

The Horn Silver Mining Company, of Utah, have declared a dividend of 75c. a share, aggregating \$300,000, payable on 15th inst., thus swelling the total of dividends to \$3,100,000.

For the information of those of our readers who have invested in U.S. Mining Stocks we publish the following:

ASSESSMENT DIRECTORY.

(N.Y. Mining Record.)

This table is prepared from the official advertisements published by the organ of the San Francisco Stock Exchange.

[Stocks are sold in New York with assessments paid fifteen days anterior to the date of delinquency at office of the Company, as given in the table below.]

Name of Company.	No.	Amount	When Levied.	Delinquent in Board.	Delinquent in Office.	Day of Sale.
Tohongo.....	1	30	Dec. 18...		Jan. 23...	Feb. 16...
Overman.....	54	25	Dec. 22...	Jan. 22...	Jan. 26...	Feb. 18...
Aultman M. & M.....	1	02	Dec. 22...		Jan. 29...	Feb. 18...
Acme M. & M.....	7	08	Dec. 22...		Jan. 29...	Feb. 18...
Santa Annita.....	6	01	Dec. 22...		Jan. 29...	Feb. 18...
Holmes.....	81	00	Dec. 26...	Jan. 26...	Jan. 29...	Feb. 19...
Mexican.....	25	50	Dec. 26...	Jan. 26...	Jan. 30...	Feb. 20...
Christy M. & M.....	2	20	Dec. 26...		Jan. 31...	Feb. 21...
Julia.....	19	10	Jan. 3...	Feb. 3...	Feb. 5...	Feb. 23...
Copperopolis.....	1	05	Jan. 2...		Feb. 6...	Feb. 25...
Belle Isle.....	6	15	Jan. 3...	Feb. 3...	Feb. 6...	Feb. 27...
Union Con.....	25	50	Jan. 4...	Feb. 4...	Feb. 7...	Feb. 27...
Vistacion W. Co.....	41	00	Dec. 11...		Jan. 12...	Feb. 28...
North Belle Isle.....	7	10	Jan. 3...	Feb. 3...	Feb. 8...	Feb. 28...
Bodie Con.....	4	50	Dec. 21...	Jan. 21...	Jan. 30...	Feb. 29...
Pittsburg.....	17	20	Jan. 5...		Feb. 8...	Feb. 29...
Good-haw.....	15	10	Jan. 10...	Feb. 10...	Feb. 12...	Mar. 3...
Utah.....	471	00	Jan. 4...	Feb. 4...	Feb. 11...	Mar. 3...
Eintracht Gravel.....	14	05	Jan. 8...		Feb. 14...	Mar. 4...
New York Hill.....	7	20	Jan. 9...	Feb. 9...	Feb. 13...	Mar. 5...
D-y.....	14	30	Dec. 1...	Jan. 1...	Jan. 7...	Feb. 5...
Alpha Con.....	17	50	Jan. 4...	Feb. 4...	Feb. 11...	Mar. 6...
Rainbow.....	9	20	Jan. 3...		Feb. 5...	Mar. 6...
Martin White.....	17	25	Dec. 24...	Jan. 24...	Feb. 7...	Mar. 7...
Scorpion.....	17	10	Jan. 8...	Feb. 8...	Feb. 14...	Mar. 7...
California.....	10	20	Jan. 4...	Feb. 4...	Feb. 11...	Mar. 8...
Eur-ka Con.....	71	00	Jan. 15...	Feb. 15...	Feb. 18...	Mar. 10...
Mammoth Bar.....	4	15	Jan. 14...		Feb. 18...	Mar. 10...
San Miguel & La Trinidad.....	4	50	Jan. 11...		Feb. 19...	Mar. 10...
Potosi.....	14	50	Jan. 18...	Feb. 18...	Feb. 20...	Mar. 13...
Marshall.....	1	10	Jan. 24...		Feb. 23...	Mar. 14...
Blue Bluff Gravel.....	5	02	Jan. 17...		Feb. 26...	Mar. 14...
Carborca.....	8	10	Jan. 9...		Feb. 15...	Mar. 17...
Sierra Nevada.....	781	00	Jan. 16...	Feb. 16...	Feb. 20...	Mar. 17...
Union Gravel.....	18	50	Jan. 18...		Feb. 26...	Mar. 18...
The Morrell Con.....	1	10	Jan. 24...		Feb. 28...	Mar. 19...
Hale & Norcross.....	80	50	Jan. 15...	Feb. 15...	Feb. 19...	Mar. 19...
Wall St. Quicksilver.....	6	09	Jan. 22...		Mar. 1...	Mar. 20...
New Cuso.....	17	40	Jan. 18...		Feb. 28...	Mar. 31...

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J. P. FRENCH,
P.O. Inspector.

Post Office Inspector's Office,
Ottawa, Jan. 17th, 1884.

**ESQUIMALT GRAVING DOCK,
British Columbia.**

The time for inspection of plans and speci-
fications for the completion of the Graving
Dock at Esquimalt, British Columbia, is
extended to Thursday, the 17th day of Janu-
ary next, inclusively, and for receiving
Tenders to Friday the 27th day of February.

By order,
F. H. ENNIS,
Secretary.
Department of Public Works,
Ottawa, 20th Dec., 1883.

**NOTICE TO CONTRACTORS.**

SEALED TENDERS, addressed to the un-
dersigned and endorsed "Tender for Drill
Hall, Quebec," will be received at this office
until WEDNESDAY, the 5th day of MARCH
next, inclusively, for the erection and com-
pletion of

DRILL HALL, QUEBEC.

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Persons tendering are notified that tenders
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Each tender must be accompanied by an
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cepted the cheque will be returned.

The Department will not be bound to accept
the lowest or any tender.

By order,
F. H. ENNIS,
Secretary.

Department of Public Works,
Ottawa, 4th Feb., 1884.

**Notice to Contractors.**

SEALED TENDERS addressed to the un-
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until FRIDAY, the 29th day of February, in-
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tures.

Each tender must be accompanied by an
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amount of the tender, which will be forfeited
if the party decline to enter into contract
when called on to do so, or if he fail to com-
plete the work contracted for. If the tender
be not accepted the cheque will be returned.

The Department will not be bound to accept
the lowest or any tender.

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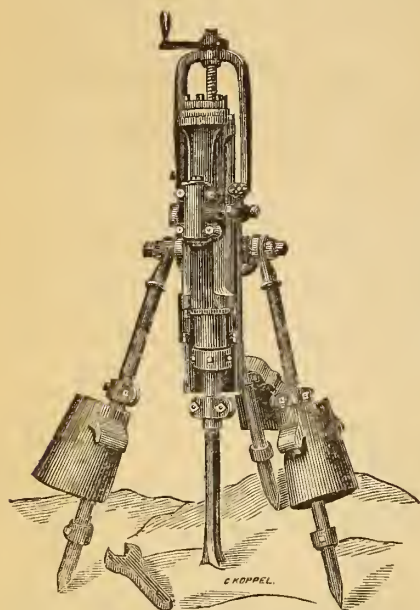
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CANADIAN MINING REVIEW

VOL. 2.—No. 3.

1884—OTTAWA, MARCH—1884

VOL. 2.—No. 3

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Visitors from the mining districts as well as others interested in Canadian Mineral Lands are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 5th of the month it is to appear.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

The various mining industries throughout Canada, from Nova Scotia to British Columbia, have been given practical and substantial impetus during the past few months through the investing of capital, varying in amounts, by syndicates and private companies organized in the United States, England and this country. This has been the long sought and necessary assistance that has occupied the attention of owners of mineral deposits in the country, and now that it has been forthcoming in so many instances there is likely to follow an era of prosperity for Canadian mining industries. In Nova Scotia,

coal mining has for years been a source of large revenue to the Province, and the development of her gold fields is now going ahead with most satisfactory results. In New Brunswick, numerous recent discoveries of economic mineral deposits have been reported, and attention is being drawn to others long since known to have existed, but which, through want of enterprise, have been allowed to continue in their virgin state. In the Province of Quebec, large forces of miners are now engaged in the successful developing of the asbestos mines, and this industry has grown into one of much importance. In the Beauce district, of the same Province, the alluvial gold deposits are being vigorously worked and are yielding gold so freely as to warrant the investment of further capital for more extensive operations. The phosphate mines of Ottawa County continue very productive, and many of the owners of undeveloped properties are awaiting the disappearance of snow to organize for active operations. In Ontario, the phosphate mines, though not of so much importance as those of Ottawa County, are returning handsome profits, and the iron deposits of the central portion of the Province are attracting much attention, and capital is coming from the United States for their development. Some of the mines in operation have become very valuable, owing to the ore-beds having greatly increased in extent, and to the improved quality of the ore, as lower levels have been reached. Encouraging reports have come recently from the Lake Superior Native Copper Company's Mine, and the Huro-

nian Mine is said to be developing to the satisfaction of the stockholders, and at the Lake of the Woods Gold mines, work will be resumed in the spring on a more extensive and substantial basis than formerly. In the North-West Territories, coal mining has, in some instances, been successfully continued during the winter, but all other mining has been suspended for the past four months, owing to the severity of cold and depth of snow, against which miners had not had the opportunity to provide themselves. A great rush is expected to the Rocky Mountain District in the spring, and it is said that in the vicinity of Kicking Horse Pass, British Columbia, the excitement in mining circles is growing intense and that the late gold discoveries at Canyon Creek, opposite the mouth of Kicking Horse, are very rich. The Selkirk and Maine Ranges, it is stated, will prove exceptionally rich, and will, in course of time, yield a mineral output that will equal that of any territory of the United States. Mining in Canada is surely growing in importance. Let miners see to it that the industry is established on an honest and practical basis.

It was with much regret that we learned that Mr. A. A. Humphrey, so well known in Canadian mining circles, had been the victim of an accident, at his Beauce gold mine, by which his leg was broken. Mr. Humphrey's numerous friends will rejoice to know that he is rapidly recovering from the injuries he received, and that he will soon be sufficiently convalescent to attend to his important duties.

A movement is on foot which, if brought to a successful issue, will be the means of attracting more attention to the apatite deposits of Canada than they have ever before received outside of the immediate districts where the deposits exist. The first step taken was in the form of a letter received during the present month by a gentleman of Ottawa known to be largely interested in the phosphate mining industry of Ottawa County, as follows:

MONTREAL, March, 1884.

W. A. ALLAN, Esq.,
Ottawa.

DEAR MR. ALLAN,

I have suggested that the British Association should make an excursion next summer to the Emerald Mine, giving them interesting experience and knowledge which might prove directly or indirectly of value to Canada. My plan is that they should leave early in the morning by C. P. R. from Montreal, take steamer to the mine, towing barges if more room is needed, and get to Ottawa in time for dinner in the evening. Lunch could be served at a Buckingham hotel or at the mines.

I thought I would suggest to you the advisability of mentioning it to the proprietors if you are in contact with them and see what response they make, and if an invitation would be issued. It struck me it might be well worth their while to take the matter up handsomely.

Yours very truly,
ROBERT C. ADAMS.

We are informed by Mr. Allan that he has laid the matter before the Manager of the Emerald Mine, who has promised to contribute liberally towards entertaining the members of the Association in a manner that will make their trip to the mine one of enjoyment as well as of interest. With the co-operation of Mr. Allan, of Ottawa, and Mr. Franchot, of the Emerald Mine, there exists little doubt that Mr. Adams will be enabled to carry out his proposed programme.

CANADIAN PHOSPHATE TRADE.

For the past ten months a report of progress at the phosphate mines has been regularly published in the REVIEW, and as no change of any importance has occurred in the condition of the mines since the last report, it will, no doubt, be of greater interest to those engaged in the industry to learn something that bears more directly on the outlook for the future profitable working of the deposits. A movement has been afloat in Montreal to circulate exaggerated and incorrect statements concerning the present condition of the phosphate market in Great Britain and Europe, and by using the *press* for this purpose, the would-be manipulators hope to alarm producers to such an extent as to induce them to dispose of the output of their mines at a price much lower than they could get for it by shipping direct to buyers across the Atlantic. This movement has been inaugurated by a few of the middle men in Montreal, who played their first card in an article which they caused to be published in the *Gazette* of that city on the 8th instant, which read in substance as follows:—

"COMPLETE BREAKDOWN OF THE PHOSPHATE MARKET.—Latest cable advices report that the phosphate market is so overstocked that business is impossible at any price. Offers of Canadian phosphate of 80 per cent., at one shilling per unit had been declined by manufacturers; that continental orders have all been cancelled on this market, as English manufacturers are trying to dispose of their surplus on the continent, and a further decline is expected."

The incorrectness of the above statements were only too apparent to all those who had had an opportunity of posting themselves on the condition of the trans-Atlantic phosphate market. At the time of the publication of the article in the *Gazette*, from which we have quoted above, this office was in possession of the most recent information concerning the condition of the English market. A general

dullness characterized the fertilizer trade, but, notwithstanding this, there was no falling off in the demand for Canadian apatite, and the price quoted for it was more than sufficient to warrant owners of mines in working their properties to their greatest capacity. Though early in the season, one sale of 1,000 tons had been reported at 1s. 3d. for 80 per cent. mineral and a standing offer for 2,000 tons additional at same price was left with seller, who retains it under consideration. About the middle of the present month, a letter was received at this office from a firm in Great Britain, who deal extensively in Canadian phosphate, expressing a readiness to enter into contract to purchase 20,000 tons of our mineral, for delivery during the next twelve or fifteen months, and on the 14th instant, an offer was received by cable for 5,000 tons of 70 per cent. Canadian phosphate at 1s. per unit *with one-fifth of a penny rise*. These facts should be sufficient to completely upset the Montreal bear movement, and to prove that the statements made in the *Gazette*, in its issue of the 8th instant, and reiterated in the same paper on the 19th instant, are unfounded, and totally at variance with fact. Let the phosphate producers of Canada avoid middle men who thus attempt to bring about a serious injury to this important industry for their own selfish temporary benefit. It has been stated that the miners who can forward but a small output are at the mercy of buyers on this side, as they cannot ship direct in small quantities, but such need not be the case if the larger producers will but co-operate with them, and pool their outputs for direct shipment. A letter recently received from Montreal from a well-known authority on phosphate mining and shipping, contains the following:—"Our miners need to pay special attention to maintaining the quality of their product, and they should be cautioned not to ship it before sold, as open consignments have a bad effect on prices."

This is good advice, and we publish it for the benefit of the phosphate miners of Canada.

THE MINISTER OF AGRICULTURE

*In his Annual Report for 1883
thus speaks of*

CANADA'S PHOSPHATE INDUSTRY.

"It is not many years ago since Canadian phosphate began to attract notice in the United States and Europe. Of late years Americans have kept a steady lookout for property in Canada which they could work themselves for the requirements of their own factories. The importance of the fertilizer trade in its present condition, and the proportions it promises to assume in the near future, are the principal causes of this diversion of interest.

When Canadian phosphate first came on the market, some eight years ago, practical men shook their heads at the hard and unpromising looking material. Many of the mills then in use in fertilizer-works were the buhrstones used to pulverize coprolite and other comparatively soft material. The difficulty of grinding has now been overcome, and it is no longer a source of danger to workmen and of perplexity to manufacturers. Instead of using it as they did coprolite, it is mixed largely with other softer materials, which enables the operating chemist to first saturate the raw phosphate with sulphuric acid, and use Canadian phosphate as a drier.

Being a more concentrated phosphate than any other in the world, it has very naturally been sought for to bring up the acid phosphate fertilizer to high percentages of phosphoric acid.

The amount of phosphate shipped from the Port of Montreal during the past calendar year was, in round numbers, 19,000 tons. This industry, in its production, materially benefits the country generally, as the men employed at the mines, the teams that haul it from the place of production, the freightage of it by rail or boat, the transshipment at the seaboard and ocean freight, all represent a certain amount of capital expended by its agency. It is expected that 24,000 tons will be shipped from Canada to Great Britain during 1884.

I have in previous reports remarked that the removal by crops impoverishes the soil and prevents it from yielding as abundantly as formerly, unless the loss is compensated by supplying phosphate fertilizers. In the districts where cattle raising is not carried on the absence of ordinary manure must be compensated for by some artificial stimulant, and experience goes to prove that for the production of cereals of every description, as well as for the strengthening and renewal of worn out lands, no available fertilizer is known that can produce such beneficial results as phosphate when subject to a chemical process, and known to the trade as super-phosphates.

The grain exported from the Port of Montreal in a single year has been estimated to contain 2,574 tons of phosphoric acid, which implies the total exhaustion, so far as phosphates are concerned, of 75,000 acres, the renewal of which necessitates the application of some 6,000 tons of phosphates.

United States statistics of commerce and navigation for 1882-83 show that 1,264 tons of raw, and 7,766 tons of manufactured phosphate were imported into that country from Great Britain direct; whilst only 254 tons of raw phosphate were imported into the United States from Canada, and it is thought highly probable, by a mining engineer who has had long experience in the phosphate industry, that much of the material

which was mined in Canada and exported to Great Britain, is returned either in the raw or manufactured condition to the United States. This circumstance points to the fact that the utmost confidence is placed by American buyers in the thorough system of inspection of the raw material in England, which guarantees the standard by careful analysis, and is the only true means by which can be avoided the substitution of inferior for higher grades, when the raw material is purchased in bulk. A reliable authority on phosphates informs me that raw Canadian phosphates contain 89-91 per cent. of tribasic phosphate of lime, according to the most authentic analysis that we have on record from picked samples selected as being the most free from admixture with foreign mineral matter. Cargo samples analysed in England have returned 85 to 86 per cent. from Canadian phosphate mines. As capital increases, and the consumption of fertilizers becomes more general, competition will be keener and our phosphate bearing districts will be worked to a larger extent than at present, naturally tending to further cheapening of production. In a comparative table of the analytical composition of phosphate from the various countries producing it recently published in the *New York Mining Journal*, with the exception of three deposits in the West Indies and one in Spain, Canada ranks the highest. Such a fact as this should have the effect of causing our phosphate producers to open up a direct trade for the raw material with the United States, and shows the advantages which would accrue from the establishment in our country of works for the manufacture of super-phosphates."

Phosphate Quotations.

The existing state of the market in England and Europe renders it difficult to quote any definite value, at present, for Canadian phosphate, though the most recent advices from the former country are of an encouraging nature. The latest sale reported is 1000 tons, at 1s. 3d. per unit for 80 per cent. mineral, with one-fifth of a penny down, and an offer from same buyer for 2000 tons additional at same price, which is yet under consideration of seller. An offer was received by cable from England, on 14th inst., for 5000 tons of 70 per cent. mineral, at 1s. per unit with one-fifth of a penny rise; this is equivalent to about \$28.25 per ton for 85 per cent phosphate in Liverpool, or \$23 in Montreal, with latest reports that the market is strengthening. One thousand tons have been placed at last mentioned figures, and miners should be cautioned not to dispose of their output until they are made aware of the tendency of the market abroad during the next two weeks.

Riviere du Lievre Improvements.

The plans for the lock and other works to be constructed at the Little Rapids have been completed and are in the hands of the Chief Engineer for approval. They have been designed so as to provide for the ample accommodation of such vessels as the navigation of the river will demand, and all necessary facilities for the driving of saw-log

and square timber have been carefully considered and supplied. Tenders will shortly be invited for the construction of the lock, etc., by the department of Public Works, and work will be begun thereon as soon as the ice leaves the river, and the spring freshets will have subsided. This will certainly, when completed, prove a great boon to the du Lièvre district, and of invaluable importance to phosphate miners, as it will enable them to ship their ore during the summer months at a very much reduced cost from formerly.

Sale of a Phosphate Mine.

The most recent sale that has been reported took place during the month, when Mr. W. A. Allan, of

Ottawa, purchased the phosphate lot number seven, in the first range of the township of Portland East, adjoining the "Rapids Mine," formerly known as the "Watt Mine." This recently acquired mine will be a valuable addition to the many phosphate properties owned by Mr. Allan, and in purchasing it he has displayed his usual good judgment and foresight. The openings on the lot expose extensive deposits of mineral of high grade, and the convenient location of the property is an important advantage. Being situated within a quarter of a mile of the Rivière du Lièvre, at the Little Rapids, the ore can be transported at small cost both winter and summer, an advantage possessed by but few other mines in the Ottawa district.

THE OCCURRENCE OF PHOSPHATE DEPOSITS.

Abstract of a Lecture delivered before the Ottawa Field-Naturalists' Club on the 28th February last, by
Geo. W. Dawson, Esq., D.S., F.G.S.
Assoc. R.S.M., etc.

Specially reported for the MINING REVIEW.

This gentleman, one of the best known and most efficient officers of the Geological and Natural History Survey of Canada, made a valuable addition to the literature of the subject of phosphate in his lecture.

He was introduced by the President of the Club, Dr. Small, and began by showing that phosphatic materials were essential to the life of both plants and animals, and that the natural cycle of rotation of these substances was interrupted by man, who withdrew from the soil, and transported to other places, large quantities of matter which would, if undisturbed, return to it. The removal of crops impoverishes the soil and prevents it from yielding as abundantly as when first cultivated unless the loss is compensated by supplying phosphatic fertilizers. The grain exported from Montreal in a single year has been estimated to contain 2,574 tons of phosphoric acid—a quantity implying the total exhaustion, in so far as phosphates are concerned, of 75,000 acres, to renew which would require the application of some 6,000 tons of apatite manufactured into super-phosphate. Under these conditions there must always be an extensive demand for phosphatic materials, and it becomes necessary to enquire where specially concentrated natural sources of supply may be found.

The occurrence of such deposits was then traced from the most recent in geological time to the oldest formation known—the Laurentian. First comes the accumulation of guano now going on wherever the climate is sufficiently dry to prevent the washing away of the bird excrements, notably on the Pacific coast of South America where rain never falls, and where not only the phosphatic, but also the nitrogenous constituents of the excrements are preserved. Next we find extensive beds of mussel shells in the estuaries of the Prince Edward Island rivers, where the deposits are known as mussel mud, and are extensively excavated by the farmers and spread without preparation over their lands. If this mud became part of a stratified deposit in the course of geological changes phosphatic nodules would be found amongst it, resulting from concretionary action, a slow process of drawing together of like particles in the mass, which is not in all cases fully understood. When the material is abundant, such concretions frequently form almost continuous layers.

In North Carolina are beds of shells, bones, and other organic remains, referable to the Tertiary period, in which this concretionary action has occurred. In some places these beds have been lifted above the level at which they were deposited, and are worked by a system of trenching and washing; in others they are yet below water, and are obtained by dredging.

Still going back in geological time, we find the coprolite beds of the South of England, in the cretaceous rocks, with new associations of animal remains. These are extensively worked, and furnish 25,000 tons of phosphate annually.

In the yet older rocks of Canada, nodules occur in the strata of the Silurian period in the Quebec group of rocks, and nodular masses are found in the primordial shales, and although these are not of economic importance in Canada, beds of similar age are worked in other countries, as Poland and Wales. These instances go to show that in whatever age large quantities of organic materials were accumulated phosphatic deposits were made from them. Following this analogy into the Laurentian series, we find vast beds of sediment deposited as in more modern formations, but these have since been so completely metamorphosed that they have entered into new chemical combinations among themselves, and become entirely crystalline—limestones crystalizing into marbles, coally materials into graphite, and phosphatic, coprolitic, or nodular layers into calcic phosphate or apatite.

Some of the Laurentian beds are found to be comparatively rich in apatite, and particularly those containing the pyroxenic rocks, in which it seems generally distributed, while certain layers, almost like beds, of nearly pure apatite occur. In other places, distinct veins and fissures are filled by processes of segregation, and frequently in connection with crystals of other substances.

The exportation from these Canadian deposits, although not fully developed, has attained considerable proportions. Dr. Sterry Hunt states that 17,840 tons were shipped from Montreal in 1883, of which the greater part went to British ports. 15,000 tons of this were mined in Quebec, the remainder in Ontario. The shipments for this year Dr. Hunt estimates will reach 24,000 tons.

The most striking fact developed in the mining of our apatite is the great irregularity of the deposits, which is easily accounted for by the extremely disturbed character of the Laurentian rocks, deposits once horizontal being folded and twisted in all directions, producing large pockets and masses of apatite, connected only by narrow and twisted seams, or entirely isolated.

Can, then, a geological survey aid in tracing these deposits? It has already been found that large tracts or zones (principally shown by Mr. Vennor) contain most of the large deposits, while intervening bands are comparatively barren, and much can yet be done in defining and mapping them down, while the further work of utilizing special deposits thus defined must always remain the work of enterprising and skilled private parties desiring to utilize them.

In the discussion which followed the lecture, Mr. Fraser Torrance, being called upon by Dr. Dawson in consequence of his long experience as a mining engineer in the neighbourhood of Ottawa, gave a very interesting description of the Ottawa Valley workings, endorsing the lecturer's statements respecting the irregularity of the deposits. He described the most productive belt as following the banks of the des Lièvres, and stated that the apatite occurred in large irregular masses, generally in connection with pyroxenic rocks, that no true veins or beds could be said to exist, the apatite in pseudo-veins gradually changing from masses to crystals scattered amongst pyroxene, while apparently well-defined beds and veins joined together to form one irregular pocket, the one passing into the other without any regular transition. No systematic attempt by sinking shafts, driving adits, or diamond-drill boring had yet been made with a view of testing the presence or extent of lower deposits, and the manner of conducting the present surface workings was calculated to throw serious difficulties in the way of any future mining of lower deposits, literally threatening to fulfil the famous prophecy of Louis XV, "Après moi le déluge."

Mr. Torrance stated, on the authority of Mr. Nimmo, Chief of the Bureau of Statistics, that during the past year the United States had imported from Canada 254 tons of apatite, from Great Britain 1,264 tons (much of which probably came originally from Canada), from Germany 44,000 tons, and 7,766 tons of super-phosphate. The speaker had some years ago examined super-phosphate manufactured in Canada, and considered that the failure of the industry was due to the lack of technical skill evinced, no thorough chemical analysis of the ingredients being made, and the products consequently varying so greatly in quality as to destroy all confidence in them. Tests with super-phosphate at the Agricultural College, Guelph, showed, he understood, great pecuniary advantage from the use of a good article.

Mr. H. B. Small stated that experiments were being made in the direction of applying, as a fertilizer, apatite and nodular phosphate, ground to an impalpable powder, without chemical preparation, and, he understood, with favourable and lasting results.

Dr. Dawson thought the experiment would not succeed, as the apatite was insoluble under ordinary conditions in soil, and that at best the method would be wasteful.

Mr. F. D. Adams, of the Survey, stated that he had detected, attached to a specimen of apatite received from Arnprior, a species of hornblende rock, which was so intimately associated with the apatite deposits of the Laurentian rocks of Norway and Finland as to be known as the "apatite-bringer," and which had never previously been found on this continent.

GOLD MINING IN BEAUCE.

At the alluvial gold diggings in the County of Beauce, Province of Quebec, the result of last summer's work, which was carried on but to a limited extent, was so satisfactory that the coming season will, doubtless, be one of unusual activity. The ground now being worked by Messrs. Humphrey and Allan, in St. George Concession, promises to yield gold in large quantities. From the bottom of their shaft, now about 140 ft. in depth, according to the most recent reports received, pay dirt is being raised, although the level is some 8 or 10 ft. above the gravel. Steam-pumps and hoists have been recently erected at the shaft, and work, henceforward, will advance more rapidly. In the spring they will begin to wash up, and the value of the dirt will then be ascertained. That the gravel above the bed-rock carries gold in large quantities there is no reason to doubt, and the opinion expressed by miners of long experience in the placer mines of California, is that this property will prove to be of greater value than its owners dare to hope for. In the St. Charles Concession, the Gilbert River Gold Mining Company are carrying on operations, under the superintendence of Capt. Richards, with a force of 28 miners, and their property has yielded a large amount of gold per man employed. During the months of July, August, September, part of October, and fifteen days in November, of last year, the wash up, according to sworn testimony of superintendent, returned eighteen thousand dollars, the biggest day's work amounting to thirty-two and one-half ounces—equivalent to about \$585. The company have two shafts sunk on this property, this winter's output from which will be washed in the spring.

NOVA SCOTIA GOLD FIELDS.

The "Mount Uniacke," "Lake Catcha," "Oxford," and the "Salmon River" mines are producing gold in large quantities and at a fair profit—the yield per man varying from three to seven dollars per day. The result of the past year's development has been of such an encouraging nature that the various companies engaged in active operations are erecting modern machinery of the most suitable design for crushing the quartz and abstracting the gold therefrom. In days gone by gold mining in this province was carried on on very primitive principles, and in a great many instances valuable properties were abandoned, after much money had been unprofitably expended through mismanagement, extravagance and absolute want of experience and knowledge on the part of the owners. Many of these properties are now falling into the hands of practical men, and in

almost every case where mining operations have been resumed the work has returned a large percentage of profit. Within the past year some new and important discoveries have been made in different localities in the province—notably the "Millesegate Gold Field," in Lunenburg County, which derives the name from a lake in the vicinity, on the borders of which gold-bearing quartz has been discovered by Micmac Indians. The existence of gold in the numerous quartz veins distributed through Lunenburg County was made known some twenty years ago, but before any practical development of the lodes had been accomplished mining operations ceased, owing to the causes already hinted at. In this recently discovered Millesegate district, mining operations were begun a few months ago, by some gentlemen of Bridgewater, N. S., and have been continued up to the present time with encouraging results. A shaft is being sunk at the "Owen" mine, cutting three distinct veins of quartz, measuring five, nine, and fifteen inches in width respectively, and through which coarse free gold is plentifully disseminated. No machinery has, as yet, been erected on this property, but we are informed by a gentleman recently from the mine, that about six tons of selected quartz taken from the shaft had been crushed, and produced no less than within a fraction of one hundred ounces of gold. If the quartz was all as rich as specimens from the mine forwarded to this office and said to be fair average samples, such a result might not unreasonably be expected.

On the opposite side of the lake, about three-quarters of a mile from the "Owen" mine, on a property known as the "Birch Brook," several openings, of about eight feet in depth, have been made at intervals on a lead extending over a distance of some eight hundred feet. The vein shows from two to three feet in width, and free gold is to be seen in all of the pits. Work on this property was suspended last autumn, pending the erection of crushers and other machinery in the spring, when it is expected that mining operations will be vigorously resumed, and it is predicted that as greater depth is reached at "Birch Brook" and the "Owen" mines they will develop into very valuable properties, capable of yielding gold in large quantities at small cost. It is not improbable that the "Millesegate Gold Field" will rank high among the gold producing districts of the Province of Nova Scotia.

Periodical information concerning the condition of the Nova Scotian Gold Mines will be thankfully received by the publishers of the CANADIAN MINING REVIEW. The names of parties forwarding such information should be attached to their reports.

ASBESTOS MINING

IN THE EASTERN TOWNSHIPS.

This industry is growing in importance year by year, and, although the output of the mines at present in operation is by no means insignificant, there exist numerous undeveloped properties throughout the district capable of yielding a very large quantity of excellent asbestos. That part of the Province of Quebec known as the Eastern Townships is the only locality in Canada where asbestos mining has as yet been carried on. In the Township of Thetford, the Boston Asbestos Packing Company's and the Johnston mines are the most productive, in fact, with the exception of a limited quantity taken from the Ward mine, near by, these properties made up all of last year's output from that immediate district. At Danville, the Jeffery mines are very rich in mineral, but are not so vigorously worked as those first mentioned. In Broughton, the asbestos that has been mined is of a very superior quality, both as regards texture and length of fibre, and a property in this township, recently purchased by the Chalmers, Spence Co., of New York, will be actively worked during the approaching summer.

Asbestos mining is not followed as is the mining of other mineral deposits—it is not mining, but quarrying, and the peculiar nature of the mineral and its associated rocks renders it unprofitable to proceed with operations during the winter months, the cold and depth of snow in the Eastern Townships being excessive. Labour in the district is plentiful and wages run at about one dollar per day for labourers and \$1.25 to \$1.50 for experienced quarrymen or drillers. The output from the mines above mentioned during the summer of 1883 aggregated about 1,100 tons, about 200 tons of which brought \$50 to \$60, the balance \$75 to \$80 per ton, and a small quantity from another section was sold for \$100 per ton. The Quebec Central Railway affords easy communication to and from the most important mines in operation, they being situated within a few hundred feet of the line and are connected with it by short tramways, over which the output is forwarded to the Q. C. R. cars for transportation.

A Gold Medal to the Asbestos Company.

A gold medal has been received by the Quebec Asbestos Company, as a first-class prize, for the finest specimen of crude and manufactured goods shown at the late Boston Exhibition. The medal bears several inscriptions and a picture of the Exhibition buildings. The company has its works on St. Charles street, and will, no doubt, earn laurels in

the markets of Europe, through this success. The manufacture of asbestos is steadily increasing.

A London, England, journal contains the following advertisement of one of the largest asbestos goods manufacturing companies in Great Britain:—"Important notice. We now supply, but do not recommend packing, millboards, etc., made from Canadian asbestos, as a second class article, at low prices. Italian asbestos is the best." There appears to be a desire on the part of English manufacturers to cry down the Canadian asbestos, but as the Italians are bidding for the product of the Canadian mines it is not at all improbable that, if exported to that country, it would find its way to England as the best Italian article, and the above announcement, which appeared in the Quebec *Telegraph* of a recent date, is conclusive evidence of the superiority of Canadian asbestos.

MINING REGULATIONS.

To govern the disposal of Dominion Mineral Lands other than Coal Lands.

The full text of these Regulations was published in the *Canada Gazette* on the 10th inst. They apply to all Dominion lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, or other mineral deposits of economic value, with the exception of coal. Any person may explore vacant Dominion lands, not appropriated or reserved by Government for other purposes, and may search therein, either by surface or subterranean prospecting, for mineral deposits, with a view to obtaining under the Regulations a mining location for the same, but no mining location or mining claim shall be granted until the discovery of the vein, lode, or deposit of mineral or metal within the limits of the claim. Any person, having discovered a mineral deposit, may obtain a mining location therefor, under the Regulations, and the conditions under which such locations may be held are clearly set forth.

Quartz-mining, Placer-mining, Nature and Size of Claims, Rights and Duties of Miners, Leave of Absence, Administration, Bed-Rock Flumes, Drainage of Mines, and Ditches are all provided for in the Regulations, and the *General Provisions* thereof embody the *Hearing and Decision of Disputes, Forfeiture* and miscellaneous clauses defining the power of the local agent.

The patent for a mining or mineral location shall reserve to the Crown, for ever, a royalty of two and a half per cent. on the sales of the product of all mines therein, and returns shall be made by the grantee, sworn to by him, or by his agent or other employé in charge of the mine, at monthly, or

such other intervals as may be required by the Minister of the Interior, of all products of his mining location, and of the price or amount he received for the same.

CORRESPONDENCE.

To the Editor CANADIAN MINING REVIEW.

SIR,—Allow me a few comments on the Mining Regulations recently issued in the *Gazette* by the Department of Interior.

One would think that with the immense mineral tracts in the States in immediate competition with our own, the mining policy of our Government should be at least as liberal as that of the Americans, but I find the lately issued regulations calculated in many ways to strongly discourage the prospectors who have, as a class, been the direct cause of the wonderful development of the mineral interests across the line. Among the sections more particularly inimical to the interests of the prospector (who is generally a poor man) are sections 5, 6, and 7, wherein it is laid down that a miner must expend during the first year \$500 in actual operations on his claim, pay \$55 in fees, and \$200 for a patent, a total of \$755; now this is an impossibility to the vast majority of prospectors, so that they must sell out at ruinous sacrifice (which will be difficult of accomplishment within a year), or forfeit their rights. Surely it will be admitted that the system common in the States of requiring an annual expenditure on the mine of one hundred dollars is fairer to the struggling miner, for then he can manage to earn sufficient, by working in other mines for wages, to fulfil the requirements, and he has time to look for a purchaser, or, by a gradual development of his claim, to become himself an independent operator (a common thing in the States).

Then in sections 79 and 80, it is provided that the Minister may declare any region a "Mineral District," and sell the claims therein to whom he may see fit; and it is elsewhere provided (section 8) that he, the Minister, may so sell claims forfeited by the first discoverers or claimants. Now, under these sections, what is of more likely occurrence than the following suppositious case? I, a prospector, having spent my last dollar on my season's outfit, strike a rich lead, say in May; I do not reach the Local Agent to file my claim till sometime in August; I proceed to look up a purchaser; I find a capitalist willing to send a trusted expert to examine the location, but, under various pretexts, more or less reasonable, the expert's report is not made until my year is almost up; then I am completely at the mercy of the purchaser; I must sell at his price or forfeit, for I cannot cause competition between buyers, as they will not send experts to examine my claim unless I bond

it to them for a certain time. If I refuse to sell at the buyer's price, I have no time to look up another purchaser, and must forfeit. Then the capitalist, by a little clever management, may buy from the Government for \$200 what it cost me a year's labour and \$1,000 to find. Is not such a case more than possible? Will any sensible man deny that these sections place the prospector completely in the hand of the capitalist; and will any one for a moment hold that it is wise thus to discourage the prospector?

Much might be said of the difficulties in connection with the administration of mining affairs by the Local Land Agent, but I will conclude with the question of "Royalty." The two and a-half per cent. is sufficiently absurd and out of date as applied to quartz mining, but it will be simply impossible to collect it from placer miners; this fact must be evident to anyone who knows the way in which gold miners work and live; if a miner washes out \$50 worth of gold dust in a day and gambles it away at night, who is to know it or collect the royalty? Clearly not the Local Agent; so that only the hard working, saving and scrupulously honest miner would be taxed.

Yours, etc.,

PROSPECTOR.

CALGARY March, 1884.

MINING NOTES.

Work at the Allan & Humphrey Gold Mine in Beauce, Province of Quebec, goes ahead apace. A large quantity of pay-dirt, raised from the shaft during the winter, awaits washing, and the manager is very sanguine of what the result will be. Rich gravel has been struck some feet above bed-rock.

Reports have been circulated that recent developments at the Canada Consolidated Gold Mining Company's Mine, in Hastings County, Province of Ontario, have been of a satisfactory nature, and that their property will prove valuable under good management. This fact might have been ascertained long ago at a great saving of expense.

The Mica Mine in Burgess Township, Province of Ontario, owned and operated by Mr. Allan, of Ottawa, is becoming more and more valuable as the output improves in quality and increases in quantity month by month. Already a large quantity has been exported to the United States and some sold to dealers in Canada.

The Millepsegate Gold Mine, in Lunenburg County, Province of Nova Scotia, is developing well, and it is stated on good authority that the gold recovered during the past winter in prospecting new ground will more than cover expenses. The owners are preparing for

active mining operations and will proceed with them early in spring.

A full report of the present condition and past history of the Lake Superior Native Copper Company's Mine has been received at the office of the *Review*. It is replete with interesting information concerning the company's experience in preparing for mining operations, their determination to thoroughly test the value of their property, their expenditure and the result of their labour. Want of space necessitates holding over, until next edition, the full text of the report.

THE IRON DEPOSITS OF CENTRAL CANADA.

(Continued from Page 6, Vol. 2, No. 2)

THE LOUISA MINE.

The following is a brief description of this mine made by Mr. Chapman. "This property comprises Lots 55, 56 and 57 of the Free Grant District, Township of Tudor. It is very densely timbered throughout its whole extent, and is held in fee simple. The main outcrops of ore occur upon a thickly wooded slope, and indicate without question a very large supply, apparently forming an imbedded mass or "stock," the principal axis of which extends in a general east and west direction, and is traceable throughout a length of at least 1,400 feet. Seven or eight trenches have been opened across the face of the slope, in very solid ore, from the base to within a short distance of the summit, in lengths of from 60 to about 160 feet, but outlying exposures show the mass of ore to extend much beyond these limits. The ore is strongly magnetic, and holds over 60 per cent. metallic iron, but unfortunately contains titanium. The amount of the latter is said to be quite low in samples obtained from some of the exposures; but in the samples analyzed by the writer 8.08 titanic acid was obtained, equivalent to 5 per cent. titanium. The complete analysis yielded:

Ferrous Oxide.....	25.85
Ferric Oxide.....	57.51
Titanic Acid, 8.08 = Titanic Sesquioxide.....	7.30
Phosphorous.....	0.01
Sulphur.....	0.06
Silicious Rock-matter.....	9.31
	100.04

Metallic Iron—60.36 per cent."

This mine has been condemned because of the amount of titanic acid in the ore, but ores containing much more than this percentage of titanium are successfully worked in Europe, by mixing them with other ores, and Dr. Hunt, of Montreal, one of the best authorities, asserts that when the mixed ores do not contain in all more than eight per

cent. of titanic acid they can be successfully worked and without any impairment of the value of the product. It is confidently believed that by mixing 50 per cent. of this ore with that from Wallaston there will be no difficulty in working it, and that the very small amount of phosphorous and sulphur will render it one of the most valuable ores to be used in combination with other ores. It should be added that the company does not intend to work this mine, and do not regard it as of any value.

Mr. Chapman also furnishes the following description of

THE BENTLIFF MINE OF THE TOWNSHIP OF MARMORA.

This property—held in fee simple—forms the west half of Lot 13, in the 10th concession of Marmora. It comprises 200 acres, partly cleared, but consisting in chief part of richly timbered land, lying about six miles from the present terminus of the North Hastings Railroad, and two miles from a projected line of railway. Its distance from Madoc (by road) is about eleven miles, and from Marmora, six miles. With the exception of five or six trial pits at considerable distances apart, this property remains undeveloped; but as all the pits show ore, there is evidently a considerable amount upon the lot, although this is more or less thickly capped by quartzite in most places. But the ore itself is of so remarkably a fine quality that any expenditure in opening up the ground would be warranted. It consists of an almost chemically pure hematite or specular iron ore, holding, according to my analysis, 69.30 per cent. metallic iron, with less than one per cent. of intermixed rock-matter, mere traces of sulphur and phosphorus, and no traces of titanium. It presents a steel-grey color and dark-red streak, and its structure under the microscope is seen to be finely porous. The ore is thus more or less permeable to gases, and would work kindly in the furnace. My analysis yielded:

Ferric oxide.....	99.07
Manganese oxide.....	trace
Titanium.....	none
Phosphorous.....	trace
Sulphur.....	trace
Silicious Rock-matter.....	0.89
	99.96

These constitute but a small part of the known locations of ore on the property opened up by the O.C.R.R. Widely separated as they are, and yet all plainly connected by the geological formations, it is fair to assume that they constitute but a small fraction of the valuable deposits of ore; that when the territory is fully developed it will not be excelled in mineral wealth by any other territory on the continent, not even by the wondrously rich deposits of the Lake Superior region.

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						Date.	Amount per Share.			Date of Payment.	Amount per Share.		
Amie Con. Mining Co., Col	\$ 09	\$ 45000	500000	\$10	5000000					October 2, 83...		7	\$330000
Atlantic Copper M. Co., Michigan	8 00	320000	40000	25	1000000	April 5, 75....	.....	.....	180000	Feb. 1, 84....	1 00	4	269000
Bassick Mining Co., Colorado	8 25	825000	100000	100	1000000	.....	.....	.....	.....	March 5, 84....	1 00	5	425000
*Black Bear Quartz Gold M. Co., California	.....	.....	30000	100	3000000	.....	.....	.....	15000	Dec. 28, 83....	20	84	887000
Boston & Montana Gold M. Co., Montana	.....	.....	200000	10	2000000	.....	.....	.....	.....	Jan. 10, 83....	05	17	310000
Bodie Con. Mining Co., California	9 50	950000	100000	100	1000000	December 21, 83	.....	4	200000	April 5, 84....	50	23	1470000
Bulwer Con. Mining Co., California	2 00	200000	100000	100	1000000	December 12, 77	.....	1	30000	Jan. 31, 84....	10	19	175000
Bonanza King, Colorado	10 50	1050000	100000	.....	.....	.....	.....	.....	.....	March 5, 84....	25	4	100000
Consolidated Gold Mining Co., Georgia	.....	.....	100000	5	500000	not assessable..	.....	.....	.....	October 10, 83..	02	27	106000
California Gold Mining Co., Gilpin Co., Col.	.....	.....	130000	.....	.....	.....	.....	.....	.....	August 13, 83..	25	2	65000
Calumet & Hecla Copper M. Co., Michigan	233 00	23300000	100000	25	2500000	.....	15 00	.....	1200000	Feb. 15, 84....	5 00	.....	24850000
Carbonate Hill Mining Co., Col.	.....	.....	200000	10	2000000	.....	.....	.....	.....	April 1, 84....	05	8	80000
Catalpa Mining Co., Leadville, Col.	35	105000	300000	10	3000000	not assessable..	.....	.....	.....	June 15, 83....	10	5	240000
Central Copper M. Co., Michigan	10 00	200000	20000	25	500000	Sept. 10, 61....	65	.....	100000	Feb. 1, 84....	2 00	21	1710000
Christy Mining Co., Silver Reef, Utah	.....	.....	60000	100	6000000	.....	.....	.....	.....	Feb. 9, 83....	10	15	90000
†Contention Company, Arizona	.....	.....	250000	50	12500000	.....	.....	.....	.....	Dec. 24, 83....	25	19	1125000
Copper Queen Mining Co., Bisbee, Ariz.	.....	.....	250000	10	2500000	.....	.....	.....	.....	Jan. 17, 84....	40	18	1125000
Crescent Mining Co., Utah	16	60000	60000	.....	.....	.....	.....	.....	.....	October 25, 83..	05	4	150000
Deadwood-Terra Mining Co., Black Hills	.....	.....	200000	25	5000000	not assessable..	.....	.....	.....	Jan. 20, 83....	10	26	\$900000
Dean Mining & Prospecting Co., of Col.	.....	.....	100000	.....	.....	.....	.....	.....	.....	Dec. 1, 82....	50	1	50000
Derbec B'ue Gravel Mining Co., Cal.	.....	.....	100000	.....	.....	.....	.....	.....	.....	March 15, 84....	10	2	20000
Dunkin Mining Co., Col.	21	42000	200000	25	5000000	.....	.....	.....	.....	October 2, 83....	.....	16	210212
Evening Star Mining Co., Col.	.....	.....	50000	10	500000	not assessable..	.....	.....	.....	October 25, 83..	50	56	1400000
Eureka Con. Silver M. Co., Nevada	4 25	212500	50000	100	5000000	Jan. 15, 84....	1 00	7	350000	July 27, 82....	25	25	4817500
Father DeSmet Con. Gold M. Co., Dakota	2 60	260000	100000	100	10000000	Nov. 13, 78....	.....	2	200000	March 31, 84....	20	31	740000
Franklin Copper Mining Co., Mich	11 25	495000	44000	.....	.....	June, 77....	.....	.....	360000	Jan. 1, 84....	2 00	.....	320000
Grand Central Mining Co., Tombstone, Ariz.	.....	.....	100000	100	1000000	.....	.....	.....	.....	December, 82....	50	16	800000
Great Western Quicksilver M. Co., Cal	.....	.....	50000	100	5000000	Aug-nt 25, 73..	15	.....	35500	October, 82....	25	.....	262500
Hecla Con. Mining Co., Montana	.....	.....	30000	50	1500000	.....	.....	.....	.....	Feb. 1, 84....	50	.....	582500
Homestake Mining Co., Deadwood, Dakota	9 50	1187500	125000	100	12500000	April 8, 78....	.....	2	200000	March 25, 84....	20	67	2312500
Holyoke Mining Co., Idaho	.....	.....	200000	.....	.....	.....	.....	.....	.....	Nov. 19, 83....	02	14	58000
Horn Silver Mining Co., Utah	7 50	3000000	400000	25	10000000	none	.....	.....	none	Feb. 15, 84....	75	12	3100000
Hope Mining Co., Montana	.....	.....	8000	.....	.....	.....	.....	.....	.....	Dec. 31, 83....	1 50	.....	12433
*Idaho Gold M. Co., (Grass Valley) Cal	.....	.....	3100	100	310000	.....	.....	.....	.....	Feb. 9, 84....	5 00	1 71	343015
*Indian Queen Mining Co., Nevada	20	60000	300000	2	600000	Feb. 11, 80....	15	3	12000	July 2, 83....	03	31	37400
Iron Silver Mining Co., Leadville, Col	1 30	650000	500000	20	10000000	.....	.....	.....	.....	Jan. 9, 84....	20	13	122000
Jocunita Mining Co., Mexico	.....	.....	100000	100	10000000	.....	.....	.....	.....	Feb. 29, 84....	50	11	100000
Kentuck M. Co., Nevada	.....	.....	30000	100	3000000	Nov. 23, 81....	.....	17	342000	Mar. 19, 84....	10	44	128500
La Plata Mining & Smelting Co., Col	.....	.....	200000	10	2000000	not assessable..	.....	.....	.....	October 2, 82....	30	35	61000
Leadville Con. Mining Co., Col.	50	200000	400000	10	4000000	.....	.....	.....	.....	Dec. 20, 83....	05	18	37000
Lexington Mining Co., Montana	.....	.....	40000	100	4000000	.....	.....	.....	.....	Feb. 23, 84....	2 00	.....	38000
Little Chief Mining Co., Col	50	100000	200000	.....	.....	.....	.....	.....	.....	Jan. 22, 84....	10	9	74000
Mt. Diablo M. Co., Nev.	2 50	125000	50000	.....	.....	.....	.....	.....	.....	November 25, 83	25	4	5000
Mt. Pleasant M. Co., Cal.	.....	.....	150000	1	150000	.....	.....	.....	.....	Dec. 27, 83....	20	4	9000
Morning Star Con. M. Co., Leadville, Col.	.....	.....	100000	10	1000000	.....	.....	.....	.....	Nov. 22, 83....	25	19	71500
Napa Con. Quicksilver, M. Co., Cal	50	50000	100000	7	700000	not assessable..	.....	.....	.....	November 1, 83	20	30	31000
Navajo Mining Co., Tuscarora, Nevada	3 00	300000	100000	100	10000000	March 7, 82....	.....	10	255000	May 14, 83....	25	9	22500
*New York Hill Gold Mining Co., Cal	.....	.....	50000	100	5000000	March 26, 78..	20	6	55000	August 10, 82..	10	21	21500
Northern Belle Milling & Mining Co., Nev.	07	3500	50000	100	5000000	June 30, 84....	8 00	2	425000	April 16, 83....	50	71	251250
Ontario Mining Co., Utah	28 00	4200000	150000	100	15000000	.....	.....	.....	none	March 31, 84....	50	93	537500
Osceola Con. Copper M. Co., Calumet Dis Mich	16 00	800000	50000	25	1250000	.....	.....	.....	.....	April 1, 84....	50	18	103500
Original Mining Co., Butte, Montana	.....	.....	60000	25	1500000	not assessable..	.....	.....	.....	March 7, 84....	05	31	9300
Oxford Gold Mining Co., Nova Scotia	.....	.....	100000	.....	.....	.....	.....	.....	.....	Dec. 10, 83....	.....	10	3000
Paradise Valley Mining Co., Cal.	.....	.....	100000	100	10000000	.....	.....	.....	.....	Jan. 28, 84....	10	1	1000
Pleasant Valley Mining Co., Cal.	.....	.....	100000	100	10000000	Sept. 8, 83....	15	2	30000	Dec. 15, 82....	05	6	3000
Plumas Eureka Gold Mining Co., Cal.	7 50	304687	140625	10	1406250	.....	.....	.....	.....	October 12, 83.	50	.....	161717
Plymouth Con. M. Co., Cal.	.....	.....	100000	.....	.....	.....	.....	.....	.....	March 3, 84....	50	10	50000
Prussian Mining and Milling Co., Col	.....	.....	150000	10	1500000	.....	.....	.....	.....	Jan. 15, 83....	10	10	13200
Quincy Copper Mining Co., Michigan	45 00	1800000	40000	25	1000000	.....	15 00	.....	200000	Feb. 20, 84....	4 50	31	379000
Richmond Con. Silver M. Co., Nevada	†21 25	1147500	54000	25	1350000	.....	.....	.....	.....	August 10, 83..	1 25	36	397488
San Francisco Copper M. Co., Cal	.....	.....	50000	.....	.....	.....	.....	.....	.....	Feb. 20, 83....	05	11	2750
Sierra Buttes Gold M. Co., Cal	6 25	765625	122500	10	1225000	paid up	.....	.....	.....	October 12, 83.	25	.....	134497
Sierra Grande M. Co., New Mexico	75	300000	400000	.....	.....	.....	.....	.....	.....	October 2, 83..	25	7	70000
Silver King Mining Co., Arizona	6 00	600000	100000	100	10000000	.....	.....	.....	.....	Dec. 15, 83....	25	43	130000
Standard Con. Mining Co., California	2 50	250000	100000	100	10000000	.....	.....	.....	.....	March 12, 84....	25	80	445000
†Silver Cord Silver M. Co., Colorado	.....	.....	500000	10	5000000	.....	.....	.....	.....	Nov. 1, 83....	10	3	22500
St. Joseph Lead Co., Missouri	.....	.....	100000	10	1000000	.....	.....	.....	.....	Dec. 20, 82....	20	22	39000
Smuggler Con. M. Co., Colorado	.....	.....	60000	.....	.....	.....	.....	.....	.....	August, 83....	20	10	6670
Socorro M. & M. Co., New Mexico	.....	.....	2500	100	250000	.....	.....	.....	.....	March 15, 82....	1	2	400
Syndicate Mining Co., Cal.	.....	.....	100000	100	10000000	.....	.....	.....	.....	March 5, 84....	10	2	2000
Total Wreck M. Co., Arizona	.....	.....	.....	.....	.....	.....	.....	.....	.....	May, 83....	.....	1	5000
United Gregory M. Co., Gilpin Co., Col.	.....	.....	300000	1	300000	.....	.....	.....	.....	April 1, 83....	04	3	3820
United Verde Mining Co., Arizona	.....	.....	300000	.....	.....	.....	.....	.....	.....	March 10, 84....	20	2	9750

*Shares not in market. †Latest London quotations. ‡Price bid. \$The Deadwood has previously paid \$275,000 in eleven dividends and the Terra \$75,000. ||Only paid on 450,000 shares. ¶This company as the Western up to Dec. 10, 1881, paid \$1,475,000.

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Manitoba Penitentiary," will be received at
this office until MONDAY, the 17th March
next, inclusively, for the erection and com-
pletion of

**ADDITIONAL CELL WING, BOILER HOUSE,
&c., AT**

Manitoba Penitentiary.

Plans and specifications can be seen at the
Department of Public Works, Ottawa, and at
the Dominion Public Works Office, Winni-
peg, Manitoba, on and after MONDAY, the
11th February next.

Persons tendering are notified that tenders
will not be considered unless made on the
printed forms supplied, and signed with their
actual signatures.

Each tender must be accompanied by an
accepted bank cheque, made payable to the
order of the Honourable the Minister of
Public Works, equal to five per cent. of the
amount of the tender, which will be forfeited
if the party decline to enter into a contract
when called on to do so, or if he fail to com-
plete the work contracted for. If the tender
be not accepted the cheque will be returned.
The Department does not bind itself to ac-
cept the lowest or any tender.

By order,

F. H. ENNIS,
Secretary.

Department of Public Works,
Ottawa, Jan. 9th 1884.



NOTICE.

TENDERS will be received by the under-
signed until Tuesday, the 8th April,
prox., from persons desirous of leasing the
privilege of ferrying across the River Ottawa
between the Village of St. Thomas d'Alfred
in the County of Prescott, in the Province of
Ontario, and Montebello, in the County of
Ottawa, in the Province of Quebec, subject to
regulations approved of by Order in Council
of the 3rd March, inst., copies of which can
be procured on application to the under-
signed, or to M. Battle, Esq., Collector of In-
land Revenue at Ottawa.

Each proposal must be accompanied by a
cheque marked good on one of the chartered
banks doing business in Ottawa for one-half
the amount of one year's rent. In the case of
the accepted tender this cheque will be de-
posited on account of the first year's rent.
The cheques accompanying all unsuccessful
tenders will be returned, but in the event of
the withdrawal of any tender the amount will
be retained.

E. MIALL,
Commissioner of Inland Revenue.
Department of Inland Revenue,
Ottawa, March 14th, 1884.



NOTICE TO CONTRACTORS.

SEALED TENDERS, addressed to the un-
dersigned and endorsed "Tender for Drill
Hall, Quebec," will be received at this office
until WEDNESDAY, the 5th day of MARCH
next, inclusively, for the erection and com-
pletion of

DRILL HALL, QUEBEC.

Plans and Specifications can be seen at the
Department of Public Works, Ottawa, and at
the Dominion Public Works Office, Post Office
Quebec, on or after Friday the 15th instant.

Persons tendering are notified that tenders
will not be considered unless made on the
printed forms supplied, the blanks properly
filled in, and signed with their actual signa-
tures.

Each tender must be accompanied by an
accepted bank cheque, made payable to the
order of the Honourable the Minister of Public
Works, equal to five per cent. of the amount of
the tender, which will be forfeited if the
party declines to enter into a contract when
called on to do so, or if he fail to complete the
work contracted for. If the tender be not ac-
cepted the cheque will be returned.

The Department will not be bound to accept
the lowest or any tender.

By order,

F. H. ENNIS,
Secretary.

Department of Public Works,
Ottawa, 4th Feb., 1884.

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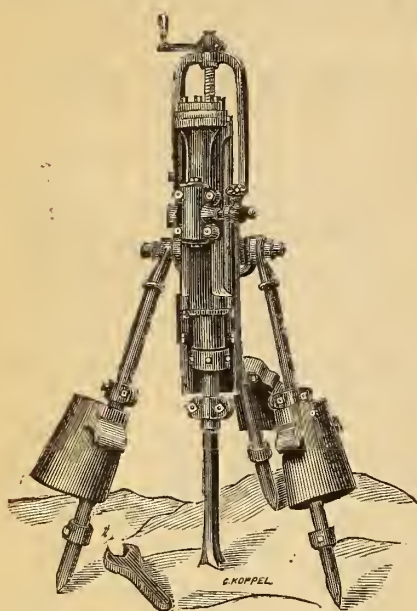
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The CANADIAN MINING REVIEW is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts as well as others interested in Canadian Mineral Lands are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 5th of the month it is to appear.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

During the past month mining operations in Canada have, to a certain extent, received a check on account of the breaking up of winter and the consequent inconvenience occasioned by surface water from the melting snow. The snow has now quite disappeared from about the mines, and does not any longer interfere with actual mining, but the roads leading to the mines are not yet in a fit condition for comfortable travelling, and the water routes are blocked with ice. By the close of the coming month, however, the communication by land and water will be open and

mining operations will be engaged in more vigorously than ever before. In Nova Scotia work will be begun on some recently discovered gold locations, and mining will be resumed on properties that for years have been abandoned. According to the annual report of the inspector of mines for the Province of Nova Scotia, the production of minerals during 1883 was in excess of 1882 in every instance with the one exception of manganese ore, which fell off 55 tons, and it is expected that the production for the present year will show a still further increase. Very little information has reached us regarding mining operations in New Brunswick, but in the Province of Quebec mining is rapidly becoming an important industry. As far east as Beauce County gold mining is making rapid strides and the success which has attended the operations of the Gilbert River Gold Mining Company, in St. François, and of Messrs. Allan & Humphrey, in St. George's Concession, has attracted much attention, and the result of the "wash up" at these mines is anxiously awaited. In the Eastern Townships of the same Province, asbestos mining will be resumed immediately and development work begun on some locations recently acquired by an American company. Some of the copper mines in the vicinity of Sherbrooke have been continuously worked during the winter, and with satisfactory results. Proceeding westward, the phosphate mines of Ottawa County are giving work to an increased number of miners, and during the winter about 200 teams were

steadily employed in forwarding the mineral to points on the line of the C. P. Railway; up to the present time the output is considerably in excess of what it was at the same date last year, and the mines have greatly improved with development. The phosphate that has been forwarded is of a much higher grade and mining is being conducted on more systematic principles. In Eastern Ontario, in the Perth District, a fair quantity of phosphate is ready for shipment, and a good quality of mica is being shipped from Mr. Allan's mine in North Burgess. The iron mines to the North of Kingston and Belleville have been increased in value during the past year by the construction of the Kingston and Pembroke, and the Ontario Central Railways, and the mines in the last mentioned locality are yielding high grades of hematite and magnetic ores. The Lake Superior Native Copper Company is doing good work at Mamainse, Algoma District, and much is expected from the Rabbit Mountain and Huronian Silver Mines, also in the District of Algoma. It is expected that work will be resumed almost immediately at the gold mines of the Lake of the Woods, and in Manitoba mining operations will be carried on to some extent during the approaching summer. In the North-West Territories and the Rocky Mountain section of British Columbia, much excitement has been occasioned by the discovery of gold, silver, copper and coal in rich deposits, and miners are preparing for active and extensive operations at an early date. Some of the mines in this locality have been worked all winter,

but no authentic reports have reached us during the past month of the value of the output, though there is reason to believe the mines have been worked at a profit. The present year promises to be one of unusual activity in the mining centres throughout the Dominion.

The *Halifax New Era* of April 5th contains a column of "mining matters," relating to the Nova Scotia gold mines, but the editor has omitted to give credit to the CANADIAN MINING REVIEW, from which the articles have been copied. The *New York Mining Record* of April 12th reprints one of the articles, and, owing to the omission referred to, credits *New Era* with its authorship.

CANADA'S PHOSPHATE TRADE.

Much has been said during the past few weeks concerning the outlook for this trade for the coming season of navigation, when the output of the mines will be offered in England and on the continent. Reports have been set afloat that prices had suddenly and seriously declined, and that the foreign markets were overstocked. Such, we are happy to say, is not the case, and we are in a position now to reiterate what was stated in last month's number of the REVIEW, that in England, especially, Canadian apatite is in good demand. Enquiries are also coming from manufacturers of fertilizers in the United States, who are seriously considering the advantages of importing our phosphate to be used in the manufacture of super-phosphate in connection with the American

mineral and other phosphates, and it is not at all unlikely, that within a very short time, a new market will there be opened for the product of Canadian mines. As may be seen by our "quotations," there is no truth whatever in the reported drop in prices, and the number of enquiries that have reached us within the past few weeks from abroad is evidence that there is no falling off in the demand. Producers will be wise to consider well before placing their output at reduced prices with buyers who, though anxious to buy, are endeavouring to bear the market by circulating ridiculous reports that our mineral is becoming unpopular with manufacturers abroad. Nothing could be more incredible to those who are informed on the trans-Atlantic phosphate trade. Our mines are producing a high grade of mineral in large quantity and the output for shipment this year will exceed that of 1883 by several thousand tons. At the present time, as nearly as can be estimated, there has been forwarded to various points of shipment already from the mines in Ottawa County, 12,950 tons of first quality, and 1,300 tons of second quality. It is estimated that about 9,500 tons additional will be forwarded before the close of navigation, which will make a total of 22,450 tons for the year's output of first quality, and 1,300 tons of "seconds," or about 6,000 tons more than last year's shipments amounted to from the same district. From the Perth and Kingston mines, the output will probably reach 2,500 tons.

THE MINES.

Without one exception the phosphate mines of Ottawa county have improved during the past few months and are now capable of yielding a larger output than ever before.

In the Township of Portland West the *High Rock* mine gives employment to about 75 miners and work has been resumed in some of the old pits with astonishing results. In places where it was thought the deposits had given out, a small amount of dead work has exposed other extensive ore beds. The *Union Phosphate Mining and Land Company's* mines, in the same

Township, have steadily increased in value with development. This property is now thoroughly equipped for permanent operations, and, with proper management, it cannot fail to return a handsome annual profit to the company. The deposits are almost innumerable and are of a character indicating that they will become more extensive as work progresses. From 60 to 70 men are employed by this company and the quantity of phosphate that has been forwarded from its mines is of a very high grade and shows that attention has been given to careful dressing.

In Portland East the *Dominion Phosphate Company* is raising a fair quantity of very high grade mineral from its North Star Mine which is developing well and shows signs of becoming very productive. Mining operations are conducted by this company in a workmanlike manner that reflects credit upon the manager, Mr. W. H. Smith. The next mine of importance in this Township is the *Rapids* mine, owned by Mr. Allan, of Ottawa. All the shafts on this property show large bodies of phosphate at the bottom, and, where new ground has been opened, some fine deposits have been exposed. The property adjoining this mine, recently purchased by Mr. Allan, promises to become very valuable with development.

The *Emerald*, in Buckingham Township, the property of the Ottawa Phosphate Mining Company, is acknowledged the most valuable mine yet discovered in the district; the vastness of the deposits on this property cannot be realized but by personal observation. The entire mountain appears to be charged with mineral, and the ore beds are apparently inexhaustible. This mine will contribute largely to the annual production of Canadian phosphate.

In the Township of Templeton, McLaurin & Blackburn, Jackson Rae, Gillespie, Moffatt & Co., and J. H. Post have forwarded a fine lot of phosphate to the front and the mines are all looking and doing well. The Templeton, P.Q., Phosphate Mining Company, an American organization, have purchased property in this township and will begin operations on an extensive scale almost immediately.

In Wakefield, the mines have been yielding liberally. The *Gem-mill*, the *Haldane* and the *Moore* have been greatly improved by the past winter's work, and are capable of producing a large quantity of high grade phosphate. Mr. Harris is also mining in Wakefield and has forwarded several hundred tons to Ironsides during the winter.

Phosphate Quotations.

Although the market price for Canadian apatite has not yet been definitely agreed upon, it is reasonable to base quotations on the most recently reported transaction. Three thousand eight hundred tons have been placed

in London during the past month at 1s. 3d. for 80 per cent. *with a fifth of a penny rise*. Later advices report buyers offering one shilling and two pence three farthings per unit for 80 per cent. There is steady demand in England, and the market is strengthening.

Opening of Navigation.

The ice has moved from the Riviere du Lievre and the steamboats are now plying between the landing at Buckingham Village and the Phosphate Mines adjacent to the river. This is unusually early for the opening of navigation, and will be a great convenience to mine owners and those who have occasion to visit the phosphate mines in the du Lievre section of Ottawa County.

It has been definitely decided by the Chief Engineer of the Department of Public Works to construct the lock at the Little Rapids of stone instead of timber as originally designed. This is a wise decision and will give a structure of an ornamental and permanent character. Work will be started early in the season and hurried on to completion.

BEAUCE GOLD MINES.

Reports recently received from the district go to show that gold mining is not unlikely to become of as great importance in Beauce as it has been at any time in the history of the Californian and Australian diggings.

The Gilbert River Gold Mining Company is doing good work and raising gold in quantity at large profit.

At the Allan and Humphrey Mine, in St. George Concession, the prospects are very bright. The dirt now being raised from the shaft carries gold plainly visible to the naked eye, and as the level is yet some feet above gravel, it is a certainty that when the gravel is reached gold will be found in large quantities. A rumour came to us last month that the miners had already struck rich gravel, but that is incorrect, as they are yet a few feet above it. A large quantity of dirt will be washed in the spring, and its value, which is known to be high, will be established. The present appearance of this mine promises a rich harvest to its owners, and the excitement already created by the prospects threatens to bring a large influx of prospectors and miners to the district during the approaching summer. Messrs. Allan and Humphrey have been fortunate in securing extensive additional areas adjoining their original property and on the same lead. The pluck and perseverance they have displayed in pushing ahead with mining operations under adverse circumstances deserves to be richly rewarded, and there is no doubt now that it will be.

ROCKY MOUNTAIN MINES.

(Special to the CANADIAN MINING REVIEW.)

SILVER CITY, N. W. T.,

April 5th, 1884.

Some of the silver mines are being continuously and vigorously worked. The "Queen of the Hills," the "Home Stake," and the "Healey" work day and night shifts with most satisfactory results, and operations are about to be started at the "Hetherington," which, if report be correct, is likely to develop into a mine of great value. The provisional directors of the company owning this last mentioned property are: Hugh J. Macdonald, President; W. Scott, Vice-President and General Manager; C. G. Ballentyne, Secretary; Hon. C. P. Brown, T. G. Orton, M.P., J. Stewart Tupper, J. F. Field, L. L. Bedson, Wm. Clougher, Wm. Paisley, John Hetherington. The charter will shortly be issued.

A miners' protective union is to be formed here in a few days, with Mr. Bleecker, of Calgary, as its solicitor. The objects of the union will be the discussion of the mining industry of the district, mutual improvement and protection, assisting the Government in matters affecting the interests of miners, and, by co-operating with the agents and other government representatives, establishing mining in the North-West Territories on a practical and equitable basis. Such an organization is invaluable to any mining community, and the people of Silver City are not slow to act in matters which are likely to advance their prosperity.

The latest despatch received from Silver City announces a rich gold discovery quite near the town, and that great excitement prevails in consequence.

BRITISH COLUMBIA.

In the vicinity of Kicking Horse Pass, to the east of the Cascade range, and that portion of the province contiguous to the Valley of the Fraser River, miners and prospectors report the recent discovery of valuable deposits of gold, silver, copper, iron, coal and other economic minerals. The cost of transporting provisions into the interior has prevented rapid development and location of mining camps, but the opening of the railway to the summit of the Rockies on the east, and to the head of Kamloops on the west, will have the effect of stimulating the mining industry to a wonderful degree. Already extensive preparations are being made by miners and prospectors in Victoria to push the season is sufficiently advanced to admit of their so doing. The Legislature at its recent session amended the mining laws,

are pronounced by miners to be liberal and to suit the requirements of the country.

The Rocky Mountains of British Columbia are rich in mineral wealth, which would long ago have been developed could facilities have been provided for importing provisions and machinery and exporting the product of the mines. The construction of the Canadian Pacific Railway will remove the difficulty, and an influx of prospectors, miners, and speculators will follow. At Quartz Creek, about forty miles from Kicking Horse, B.C., placer diggings have been discovered which, it is thought, will pay from \$10 to \$20 per day, per man. These diggings were worked many years ago and abandoned on account of their utter inaccessibility.

GEOLOGICAL SURVEY.—The investigations of Mr. A. Bowman in the interior of British Columbia last summer embraced an area of about 30,000 square miles, lying between the 118th and 120th degrees of longitude and the 49th and 52nd degrees of latitude. Through this region the Canadian Pacific Railway will pass, and the geological surveys will, therefore, become increasingly interesting. Preparations are now being made to issue a new map of this region, in which will be shown the results of the labours of Mr. Bowman last year, and the survey

made in 1882. The report of the Minister of the Interior says: "The researches made in the vicinity of the Rocky Mountains prove the existence of large tracts of coal-bearing cretaceous rocks in the very heart of the range, of which the anthracite region of Devil's Head Creek is a special development."

NORTHERN CANADA.

Captain William Kennedy, of St. Andrew's, an Arctic explorer, in a lecture delivered at Winnipeg, drew attention to a region near Lake Arthabasca, into which the Peace River flows, where he stated that petroleum springs had overflowed, covering a section of country forty miles in extent, and after having been carried down the river the oil floats on the surface of the lake. At present the Indians, who are its only consumers, boil it down to the consistency of pitch and apply it as a coating to their canoes, etc. Captain Kennedy also stated that in the same region salt is abundantly found, fine and brilliantly white, and that a variety of economic minerals have been met with in large quantities, notably—sulphur, coal, copper and asbestos. He expressed the opinion that the Arthabasca district, with its vast mineral wealth, would shortly become a point of attraction for capitalists and settlers.

capitalists found the money to carry on work for the summer to test the value of these deposits, and Mr. Ingall once more took charge of the work.

Shafts were sunk upon the two veins to test their continuity in depth and further explorations of the rest of the location carried on.

One of the veins, a promising lode of rich argentiferous sulphuret of copper, was found not to continue down, but the other, a strong well defined fissure vein, carrying native copper, got richer as depth was attained and retained its definite character. Further evidence was also obtained as to the general mineralization of the district, and other veins were found worthy of further attention.

These favourable results induced the syndicate to put up a further sum to enable work to be continued during the winter of 1881-82, and it was decided to sink another shaft further inland on the course of the vein at such a distance that a drift could be run and the two connected before spring so as to secure good ventilation for continuing the work during the ensuing summer should it be decided to do so. This was done, the two trial shafts having been connected at a depth of sixty feet, although, on account of having cut heavy water, great difficulty was experienced in completing the work in time.

This work was considered to have been attended with such satisfactory results that the company was finally organized on a permanent basis in the spring of 1882, and started with a share capital of £100,000, of which the vendors took £25,000 fully paid shares in payment for the property. The board of directors decided then to at once equip the mine with a full plant of dressing and developing machinery.

This of course entailed an enormous amount of work in order to convert a barren shore, covered with second-growth bush, and with only a couple of shanties on it, into a prosperous and busy little village in one short season between the opening and close of navigation on the lake, which period is also shortened by the stormy weather of the spring and fall, rendering it impossible at those seasons to utilize the lake communications more than about one-third of the time. During the whole summer, large quantities of materials, supplies, tools and machinery were poured in and the force was gradually augmented as housing accommodation increased, until some 150 men of various callings were employed, and by the end of the season, most of the necessary buildings were up and the rest well forward or started. Most of the machinery was also on the ground, the saw-mill, hauling engine, air compressor and mine pump being in place.

The worst part of the surface work having been got over by the fall of 1882, when Mr. Ingall was obliged to resign from ill-health, the actual work of underground development was able to be vigorously prosecuted under the direction of the present manager, Capt. Williams, and with the help of compressed air drills, good progress was made, so that the state of things was as follows to October 1st, 1883:

The two main shafts of the mine, some 450 feet apart, were at the respective depths of 221 feet (No. 1), and 152 feet (No. 3). The first level had communication through between Nos. 1 and 3 shafts, and had been extended a considerable distance N. of No. 1 shaft (*i.e.* out towards the lake), and S. of No. 3 shaft (*i.e.* inland), and work had been done on the outcrop of a vein 3,000 feet inland from No. 3 shaft supposed to be the continuation of this vein.

The second level had been driven from each shaft towards the other, and only wanted some 60 feet to communicate, and was also driven a considerable distance N. of No. 1 and S. of No. 3, whilst the third level was driven some distance N. and S. of No. 1. The total length of these drifts amounted to some 1,800 feet, and they, in conjunction with the shafts, proved the vein for some 800 feet in length by about 200 feet in depth.

The plant at that date consisted of a Reliance air compressor capable of working ten Eclipse power-drills, hauling engine and direct acting Northey steam pump at No. 1 shaft, also a diamond drill, saw-mill, stationary engine, to bring up freight from the dock, etc.

The dressing machinery is housed in a building 160 feet long, whose greatest width is 95 feet and greatest height 45 feet. It consists of one head of Ball's stamps capable of putting through 145 tons of this ore per day, the copper being extracted by four jigs and four round briddles. The ore is raised to the top of this building up an incline from No. 1 shaft, worked by an engine which also works the Blake stone breaker, from which it passes down a long incline to the stamp, from thence through the jigs, etc. The necessary water is delivered to the floors from the lake through a seven-inch main by a direct acting steam pump. There are also a fine boarding house capable of holding 100 men or more, a well built and roomy store, the usual repair shop, smithy and carpenters' shop, and stable for twenty-four horses which are chiefly used to bring in cordwood from the bush. There is also a dock within 100 yards of the mine at which, in settled weather, light draft propellers can unload.

The floors commenced running on the 3rd of October last, and at the close of navigation last fall an instalment of some three barrels of dressed metal, about 85 per cent. fine, was shipped to England. Up to the 1st of April last the Manager estimated the amount of ore opened up at some

The Lake Superior Native Copper Company's Mines.

This company's property is situated at Mamainse on the Canadian shore of Lake Superior, in the District of Algoma, and is some sixty miles from the village of Sault Ste. Marie.

Until quite recently no other means than by water existed of communicating with the outer world, which entailed an immense amount of trouble and delay. When the company started mining operations, everything—coal, provisions, machinery and a large quantity of building material of all descriptions, now to be found on the spot, had to be brought from Batchewana Bay, over a stretch of water which, for a great portion of the season, was dangerous and uncertain. The nearest doctor, the nearest post office and stores, could only be reached by travelling these sixty miles in an open boat, so that communication with civilization during stormy weather was impossible, and rendered tedious under the most favourable circumstances.

In the winter, even, this means of communication was absent, and the mail had to be carried over a round-about snow-shoe trail through the bush. Now, however, the continued operation of the mines has brought about a happier state of things. The company has a steamer which, in summer, plies between Sault Ste. Marie and the mines, and in winter a road lately completed by the Ontario Government serves to keep up communication. Around the mine itself has grown up a busy little village which forms quite a feature in the landscape as seen from the lake. It has also a post office and a Government school, whilst anyone being so unfortunate as to meet with an accident, need not, as formerly, have to wait for fine weather and then take two or three days to get to the doctor, but receives prompt attention from the resident medical man, Dr. Peters.

The location now worked by the Lake Superior Native Copper Company, belonged formerly to the Quebec and Lake Superior Mining Association, who held it for some thirty years and did nothing with it until July, 1880, when they employed Mr. E. D. Ingall to examine the tract and report upon the mineral capabilities. Some seven weeks' exploration of the approachable portion of the ten square miles, composing the property, proved to be widely mineralized and that there were two veins worthy of further work being done on them. During the winter of 1880-81, nothing was done, but in the spring of 1881 some English

17,136 tons, which, he thought, would yield 428 tons of copper, and by the end of August, 1883, he expected to have enough ore in reserve to run the present mill for two years. The Company intends, next year, to double the capacity of their dressing floors.

The most serious difficulty met with in opening up this property was that of the great uncertainty of the means of communication, but the facilities in this respect are increasing rapidly, as evidenced by the opening of a line of telegraph to Sault Ste. Marie lately and the cutting through of a road from there to the mines, and when the long promised railway to that place is completed the chances of carrying on successful mining in the district will be greatly enhanced.

Calumet and Hecla Copper Mining Company.

The mining public has been startled by the announcement that the directors of the Calumet & Hecla Mining Company have decided to pass their May dividend. It is the most successful mining enterprise in America, with a record of dividends of \$24,850,000, the annual payments for a number of years having been \$2,000,000, and therefore it has been a rude shock to the many whose faith in mining has suffered under a long series of collapses. In this case, there is no reason for being frightened. The mine, so far as we can learn, is as good now as it ever was; in fact, the management is credited with adhering to the rule of having five years' work developed. Its production the last month is greater than it ever was—2,620 tons of mineral—and it is likely that the cost of production has, if anything, slightly declined. The main reason given for the passing of the dividend is, that the surplus funds are locked up, practically, in the copper now waiting for the opening of navigation to be carried to the seaboard markets. To provide for contingencies, the Company has brought overland about 2,000,000 pounds of copper; but this method of transportation involves an additional expense of upward of one half of one cent per pound. Navigation is closed from five to six months in the year, and the copper companies enter the new season therefore with a very large proportion of their annual output on their hands. In past years, this has not, apparently, hindered the directors of the Calumet & Hecla Mining Company from paying a dividend a short time before the opening of the new season. That they did not do so this year merely shows that their surplus was not so great as formerly, or that a larger amount is in the form of finished product. We understand that the directors were averse to borrowing money to pay the dividend, pending the arrival and marketing of their copper. The company has invested and is still paying out vast sums of money for the completion of the greatest mining and milling plant, designed by Mr. E. D. Leavitt, jun., that any mine in the world possesses. This may have proved a greater drain on its resources, being provided for out of current earnings, than was expected, and the decline in copper has, undoubtedly, contributed its share. With an annual product of 33,000,000 pounds of ingot, a decline of one per cent. means a fall off of revenues of \$330,000, which is probably a minimum. We have no knowledge of what the cost of production of the Calumet & Hecla is; but by inference from the known returns of a much smaller mine, the Quincy, working poorer rock, which show a cost of 9 cents, it is not rash to state that it must be less than 7 cents. Let that figure be assumed, and let it be assumed, further, that the average price realized in 1884 will not be more than 14 cents, which will be considered conservative, even taking into account that a large percentage of the product has been sold abroad at a price said to be about 13 cents New York, then the profit per pound is 7 cents, or \$2,310,000 per annum. A decline of one cent per pound would still leave an excess of income over expenditures for the production of \$2,000,000. We are, therefore, far from regarding the action of the directors in any serious light, though its wisdom has been questioned by many.

There is one point repeatedly raised during the last few days, against which we must energetically protest. It has been urged that the effect upon the market might be a serious one; that it shows that the lake companies are carrying an unusual load of copper; and that the price cannot be maintained. The fact is, that the stock of lake copper is very little if any greater than it always is at this time, and that the statistical position of the metal is very much better to-day than it was a year ago.—*Engineering and Mining Journal*.

Coxheath Copper Mining Company.

During last summer this company did a great deal of work at its mine near Sydney, Cape Breton. Leads were extended, and a good deal of ore stoped out, from which a few tons were handpicked and sent away for testing. Experiments were made on the low grade ores, and it is stated that preparations are being made for the erection of a large concentration plant this spring. Some of the copper was found to carry eighty ounces of silver to the ton.

CANADA'S IRON INDUSTRY.

ITS DEVELOPMENT IN EASTERN ONTARIO.

In the January number of the REVIEW an article appeared under the heading "The Iron Deposits of Central Canada," and was continued in the February and March numbers. Since then, efforts have been made to complete a railway system through the mineral section of the Midland district with a view to encouraging the development of the iron deposits by providing further facilities for the transportation of ore and fuel. The Central Ontario Railway Company made application to the Dominion Parliament for a charter for an extension of its road north, to intersect the line of the Canadian Pacific Railway, and in discussing the bill before the Railway Committee, Mr. J. S. McCuaig, of Picton, thus referred to the importance of granting a charter for the proposed extension:—

The Central Ontario Railway Co. have completed their extension from Benton northward to the Wallaston Mine, a distance of about eighty miles and without government or municipal aid in any form, and in addition have now under contract and in process of construction, at Weller's Bay, in the County of Prince Edward, large and extensive docks for shipping, at a nominal cost, into Lake vessels, the iron ore brought from the mines situated along their railway extension north of Trenton, and intended for export to the iron smelting works of the United States, to supply the demand for mixing with the native ores of that country for smelting purposes. The substantial and extensive dock accommodation in connection with the required dredging at Weller's Bay has already entailed an outlay of over one hundred thousand dollars and is intended to give improved facilities for the shipment of the company's ore and greatly lessen the cost of the transshipment of imported coal, intended as a return cargo. This evidence of the good faith of the proprietors of the Central Ontario Railway, and of their financial ability to carry out the proposed extension from the Wallaston Mine north to intercept the Canadian Pacific Railway, and giving the County of Prince Edward and the Town of Picton, Trenton and the County of Hastings, an all rail route connection with Winnipeg and Manitoba, the Northwest and British Columbia, for passengers and freight, aside from the still more important advantage to the whole Dominion which must result from the development of an extensive iron industry and which must establish beyond controversy the superiority of Canadian ore over even Spanish, Sweden and African ores, and which have been largely, of late years, imported into England and America to mix with the native ores of both countries for smelting purposes, together with the additional fact that already the company have disbursed in construction over two millions of their own money. I say for all those reasons united, I may be permitted to express an earnest hope to the hon. members of the committee, that they will be pleased to pass the charter of the company without amendments and protect it against the imposition of any conditions, save and except those provided for by the General Railway Act and passed in the public interest. Experience in the establishment of smelting works has demonstrated beyond all controversy, that they usually begin their growth at a point or junction where iron ore and coal centre in transportation. And reasonable hopes are entertained that the proprietors of the Central Ontario Railway may, in the prosecution of their enterprise, if clothed with the reasonable powers solicited in their charter and now before the committee be induced, and find it in their interest, to establish smelting works at their mines and also at Weller's Bay. At the risk of intruding on the indulgence of the committee, I beg respectfully to call their attention to the important advantages the establishment of iron smelting secures to any country possessing the ores. I admit it is better for Canada to mine and sell her iron ore than allow it to remain permanently unused and that to that extent the finding of a market for her ores is a legitimate source of satisfaction. And I also contend that it is equally certain that to merely mine and sell our ores is the poorest use we can make of them. Mr. Birkenbine, a gentleman of unquestioned authority, gives the cost of labour per ton as follows:—

	Days' Labour.
Digging ore.....	1
Making pig at furnace.....	1½
Making charcoal from wood.....	1¼
Cutting wood.....	1
Limestone.....	¼
Total.....	5
Charcoal iron, pig, is of the value of say:	
	Per Ton.
In New England.....	\$56
Pennsylvania.....	55
Maryland.....	60
Baltimore.....	65
Lake Superior hot blast.....	52

Canada imported during the years 1870-71 to 1879-80 (10 years), \$125,435,161 worth of iron and manufactures of iron.

Of iron.....	\$33,704,154
Of steel.....	5,408,121
Rails and plates, etc., for railways.....	31,357,532
	\$70,469,807
Machinery, hardware, and iron manufactures generally.....	54,965,358
	\$125,435,165

A calculation of the number of days' employment Canada has given to foreign countries by the importation in value of \$70,469,807, in the ten years I have named, of iron in its raw state and exclusive of the additional value of \$54,965,358 of machinery, hardware, and iron manufactures generally for the same period, will enable the members of this committee to more intelligently understand and appreciate the necessity—I might say the national and imperative necessity—of encouraging and fostering so valuable an iron industry and in the development of which the proprietors of the Central Ontario, most of whom are American capitalists, ask this committee, not for money aid or subsidy, but for a charter with such powers only as the general railway act of Canada provides for the protection of the public interest. Spain and Norway exported large quantities of ore to England to keep the Bessemer furnaces going. The United States imported for several years past from Spain and Africa from seven hundred thousand to eight hundred thousand tons of iron ore sawn. The latter country had invested of capital in the iron industries and manufactures in 1880, \$230,971,884, and wages were paid to her workmen same year, \$55,476,786. The United States produced in 1871, 1,911,608 tons, and consumed 3,190,573 tons; and in 1880 she produced 4,295,414 tons, and consumed 6,407,754 tons. Such facts seem to be lost sight of in Canada nearly altogether; we allow ourselves to be frightened by fear of distance, and come to the slothful man's conclusion with regard to iron making at home, while our more enterprising neighbours take the precious ore, with which we can do nothing, and carry it hundreds of miles to their furnaces, almost as far as we would have to carry the coal to ours. The mineral treasures with which Providence has endowed the Dominion are almost worthless to us, just because we have not the energy to use or the enterprise to develop their wealth. A civil engineer exclaims: Why has Canada, and especially Ontario, its richest and most populous province, hitherto failed to utilize to any large extent those vast stores of God-given wealth? Why have the bounties lavished upon us by Providence been hitherto so little used? Canada has within herself all the requirements to make her one of the largest iron producing countries in the world, and at such a cost as will defy competition. There now exists but one cause requiring removal that retards the development of iron manufacture, and that is the apathy of Canadians, an apathy the most extraordinary, affecting their vital interest, the one which must flourish for Canada to become a great nation, for iron manufacture has been rightfully termed the mother and the mistress of all other manufactures, for what is it but the rendering fit for use the raw material of all our tools and implements and machinery, without whose aid no other industry could ever exist. The Central Ontario Railway Company have purchased and paid for the right of way and they have built a railway extending north from Trenton, a distance of eighty miles to the iron fields or deposits of iron ore in the county of Hastings. They are asking the Dominion Parliament for a charter authorizing them to extend their railway further north to form a junction with the Canadian Pacific Railway. They have already embarked in the enterprise of their own money upwards of two millions of dollars. They have in addition commenced the construction of extensive docks, &c., at Weller's Bay, for the shipment of their ores into lake vessels and for the landing of coal, and having in view the establishment of extensive smelting works at an estimated cost of two hundred and fifty thousand dollars, and on which they have already disbursed over one hundred thousand dollars. In the prosecution of this work, which will be one of great public advantage in many ways, and more particularly in the development of our own mines and the encouragement of the establishment of iron smelting works, they have not received in aid of this vast enterprise from the Dominion Government, or from any of the municipalities benefited locally by its construction, any subsidy in money or in land. And they now ask that the charter now before this committee be allowed to pass without amendment, subject, however to any and all the conditions of the general railway act of the Dominion and passed for the protection of the public interest.

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THE HAYCOCK IRON MINE.

This valuable property has been the subject of several articles in the REVIEW, and at one time, within the past six months, it was generally understood that work at the mine would be resumed by a company composed of English capitalists. Negotiations have, however, not yet been completed, and, in the absence of any satisfactory explanation of the cause of delay, it has created some disquietude to those who are most deeply interested. The reports on the property made by well known experts, after careful examinations, are of a flattering character. Foremost among those experts who have reported upon the Haycock Iron Mine is Professor Chapman of Toronto, and, notwithstanding that Dr. Selwyn, Director of the Geological Survey of Canada, has undertaken to say that Professor Chapman's report is entirely misleading, such men as Mr. Birkenbine, of Philadelphia; Mr. Josiah Robbins, of Ohio; and Mr. Richard Howson, a well known Mining and Furnace Engineer of Middlesboro', England, endorse Professor Chapman's opinion that the mine is one of great value. Mr. Howson made a personal examination of the entire property a year ago, and his report, dated Middlesboro', 21st May, 1883, is a verification of the most favourable reports of Professor Chapman and Mr. Birkenbine. In concluding his report he states that he had several interviews with these gentlemen, and found them to be men of high character, and that he agrees with them that by prompt and energetic action, combined with good management, the property of the Haycock Iron and Steel Company will prove to be a source of considerable profit.

MINING NOTES.

At Smithville, Colchester County, Nova Scotia, Mr. H. Clarke has proved the existence of a valuable deposit of galena, and has been joined by Mr. D. L. Philips and Mr. D. L. V. Browne, M.E. These gentlemen will co-operate with Mr. Clarke in developing the property without loss of time. It is said that the cre-bed is of some extent, and that some of the ore carries gold and silver to the value of \$100 to the ton.

The Canada Consolidated Gold Mining Company are proceeding with mining operations on their property in Hastings County, Province of Ontario, and it is reported that the vein has much improved with recent development. More attention is now directed to the treating of the ore, and we are informed that with proper management and studied economy this property may yet be profitably worked. We will be obliged for full particulars as work progresses.

Now that the snow has nearly disappeared from the mountains, Mr. Allan is making preparations to begin mining operations at an early date on his mica location in Ottawa County. The specimens of mica brought in last autumn were of very fine quality, perfectly white and clear and of good size. The property will, it is thought, develop into one of great value.

The Huronian Mine, in Algoma District, is being actively worked, and developments have successfully proved its value. The company has a ten stamp mill in operation, and the ore is treated by free milling and concentration of the gold and silver it contains. A large force is employed in forwarding supplies for next summer's operations. The company values this property at an almost fabulous price, and the indications are that it will become a source of large revenue to the stockholders.

The Rabbit Mountain Silver Mine, also in the District of Algoma, has recently been sold to a syndicate of American capitalists, who have already begun active mining operations on an extensive scale. The sum paid for this property by the syndicate is said to have been very large, but we have not yet ascertained what the exact amount was.

LATER.—We are informed that Oliver Daunais, who lives at Prince Arthur's Landing, is in St. Paul, and has effected the sale of four mining locations at the Rabbit Mountain Mines, two of them to a syndicate for \$200,000, and the others to Chicago and Milwaukee capitalists for a like sum.

It is estimated that the deposits of anthracite coal in Pennsylvania amounted originally to 6,000,000,000 tons; of this, from the commencement of mining, 62 years ago, 499,010,887 tons have been disposed of as marketable coal, also during that period there has been wasted 998,021, 774 tons in and at the mines.

NOVA SCOTIA.

The Inspector of Mines in his annual report says that the following summary shows, so far as he has been able to learn, the mineral production of the Province of Nova Scotia during the year 1883 as compared with that of the previous year:

	1882.	1883.
Gold, ounces.....	14,107	15,446
Iron Ore, tons.....	42,135	52,410
Manganese Ore, tons.....	205	150
Copper Ore, ".....	.....	06
*Coal raised ".....	1,365,811	1,422,553
†Gypsum ".....	133,426	144,668
†Building Stone, ".....	4,357	181
Coke made ".....	26,731	44,189
†Grindstones, &c. ".....	2,450	155
Limestone ".....	16,584	26,477

*Ton of 2,240 lbs.

†Quantities shipped. Returns not completed. Amounts used in Nova Scotia not known.

Incorporated Dividend-Paying Mines of the United States.

NAME AND LOCATION.	Latest quotation per share.	Current value of Mine.	Number of Shares.	Par Value.	Capital Stock. Dollars.	Last Assessment.		Total Assessment to date.	Last Dividend.		Total Dividends to Date.
						Date.	Amount per Share.		Date of Payment.	Amount per Share.	
Amie Con. Mining Co., Col	\$ 09	\$ 45000	500000	\$10	5000000	.....	.....	.....	October 2, 83...	7	\$330000
Atlantic Copper M. Co., Michigan.....	8 00	320000	40000	25	1000000	April 5, 75....	.....	180000	Feb. 1, 84....	1 00	269000
Bassick Mining Co., Colorado	8 25	825000	100000	100	10000000	.....	.....	.....	March 5, 84....	1 00	425000
*Black Bear Quartz Gold M. Co., California..	.....	.....	30000	100	3000000	.....	.....	15000	Dec. 28, 83....	20	887000
Boston & Montana Gold M. Co., Montana...	.....	.....	200000	10	2000000	.....	.....	.....	Jan. 10, 83....	05	310000
Bodie Con. Mining Co., California	4 00	400000	100000	100	10000000	December 21, 83	.....	200000	April 5, 84....	50	1470000
Bulwer Con. Mining Co., California	70	70000	100000	100	10000000	December 12, 77	.....	30000	Jan. 31, 84....	10	175000
Bonanza King, Colorado..	10 12	1125000	100000	.....	.....	.....	.....	.....	April 5, 84....	25	125000
Consolidated Gold Mining Co., Georgia.....	.....	.....	100000	5	500000	not assessable..	.....	.....	October 10, 83.	02	106000
California Gold Mining Co., Gilpin Co., Col.	.....	.....	130000	.....	.....	.....	.....	.....	August 13, 83..	25	65000
Calumet & Hecla Copper M. Co., Michigan...	225 00	22500000	100000	25	2500000	.....	15 00	1200000	Feb. 15, 84....	5 00	24850000
Carbonate Hill Mining Co., Col.....	30	60000	200000	10	2000000	.....	.....	.....	April 1, 84....	05	80000
Catalpa Mining Co., Leadville, Col.....	35	105000	300000	10	3000000	not assessable..	.....	.....	June 15, 83....	10	240000
Central Copper M. Co., Michigan	21 50	430000	20000	25	500000	Sept. 10, 61....	65	100000	Feb. 1, 84....	2 00	1710000
Christy Mining Co., Silver Reef, Utah.....	.....	.....	60000	100	6000000	Mar. 19, 84....	80	60000	Feb. 9, 83....	10	90000
*Contention Company, Arizona .....	.....	.....	250000	50	12500000	.....	.....	.....	Dec. 24, 83....	25	1125000
Copper Queen Mining Co., Bisbee, Ariz.....	.....	.....	250000	10	2500000	.....	.....	.....	April 18, 84....	40	1225000
Cosmopolitan Mining Co., Utah.....	.....	.....	100000	.....	.....	.....	.....	.....	April 3, 84....	3	750000
Crescent Mining Co., Utah.....	15	90000	600000	.....	.....	.....	.....	.....	October 25, 83.	05	150000
Deadwood-Terra Mining Co., Black Hills...	.....	.....	200000	25	5000000	not assessable..	.....	.....	Jan. 20, 83....	10	\$900000
Dean Mining & Prospecting Co., of Col.....	.....	.....	100000	.....	.....	.....	.....	.....	Dec. 1, 82....	50	50000
Derbec Blue Gravel Mining Co., Cal.....	.....	.....	100000	.....	.....	.....	.....	.....	March 15, 84....	10	20000
Dunkin Mining Co., Col.....	23	46000	200000	25	5000000	.....	.....	.....	October 2, 83....	16	210212
Evening Star Mining Co., Col.....	.....	.....	50000	10	500000	not assessable..	.....	.....	October 25, 83..	50	1400000
Eureka Con. Silver M. Co., Nevada.....	4 25	212500	50000	100	5000000	Jan. 15, 84....	1 00	353000	July 27, 82....	25	4817500
Father DeSmet Con. Gold M. Co., Dakota ..	3 01	300000	100000	100	10000000	Nov. 13, 78....	.....	200000	March 31, 84....	20	740000
Franklin Copper Mining Co., Mich.....	10 00	400000	44000	.....	.....	June, 77....	.....	360000	Jan. 1, 84....	2 00	320000
Grand Central Mining Co., Tombstone, Ariz.	.....	.....	100000	100	1000000	.....	.....	.....	December, 82....	50	800000
Great Western Quicksilver M. Co., Cal.....	.....	.....	50000	100	5000000	August 25, 73..	15	35500	October, 82....	25	262500
Hecla Con. Mining Co., Montana .....	.....	.....	30000	50	1500000	.....	.....	.....	April 1, 84....	50	612500
Homestake Mining Co., Deadwood, Dakota ..	8 50	1062500	125000	100	12500000	April 8, 78....	.....	200000	March 25, 84....	20	2312500
Holyoke Mining Co., Idaho.....	.....	.....	200000	.....	.....	.....	.....	.....	Nov. 19, 83....	02	58000
Horn Silver Mining Co., Utah.....	6 75	2700000	400000	25	10000000	none	.....	none	Feb. 15, 84....	75	3100000
Hope Mining Co., Montana .....	.....	.....	8000	.....	.....	.....	.....	.....	April 1, 84....	1 50	135643
*Idaho Gold M. Co., (Grass Valley) Cal.....	.....	.....	3100	100	310000	.....	.....	.....	Feb. 9, 84....	5 00	3430150
*Indian Queen Mining Co., Nevada	20	60000	300000	2	600000	Feb. 11, 80....	15	12000	July 2, 83....	03	374000
Iron Silver Mining Co., Leadville, Col.....	95	475000	500000	20	10000000	.....	.....	.....	Jan. 9, 84....	20	1220000
Jocustita Mining Co., Mexico.....	5 00	500000	100000	100	10000000	.....	.....	.....	Feb. 29, 84....	50	1000000
Kentuck M. Co., Nevada.....	.....	.....	30000	100	3000000	Nov. 23, 81....	17	342000	April 19, 84....	10	1288000
La Plata Mining & Smelting Co., Col.....	.....	.....	200000	10	2000000	not assessable..	.....	.....	October 2, 82....	30	610000
Leadville Con. Mining Co., Col.....	45	180000	400000	10	4000000	.....	.....	.....	Dec. 20, 83....	05	370000
Lexington Mining Co., Montana .....	.....	.....	40000	100	4000000	.....	.....	.....	Feb. 23, 84....	2 00	380000
Little Chief Mining Co., Col.....	50	100000	200000	.....	.....	.....	.....	.....	Jan. 22, 84....	10	740000
Mt. Diablo M. Co., Nev.....	2 50	125000	50000	.....	.....	.....	.....	.....	November 25, 83	25	4 50000
Mt. Pleasant M. Co., Cal.....	.....	.....	150000	1	150000	.....	.....	.....	March 31, 84....	10	105000
Morning Star Con. M. Co., Leadville, Col...	.....	.....	100000	10	1000000	.....	.....	.....	Nov. 22, 83....	25	715000
Napa Con. Quicksilver, M. Co., Cal.....	75	75000	100000	7	700000	not assessable..	.....	.....	November 1, 83	20	310000
Navajo Mining Co., Tuscarora, Nevada	2 50	250000	100000	100	10000000	March 7, 82....	10	255000	May 14, 83....	25	225000
*New York Hill Gold Mining Co., Cal.....	.....	.....	50000	100	5000000	March 26, 78....	20	55000	August 10, 82..	10	215000
Northern Belle Milling & Mining Co., Nev..	07	3500	50000	100	5000000	Jan. 30, 84....	8 00	425000	April 16, 83....	50	71 2512500
Ontario Mining Co., Utah.....	23 00	3400000	150000	100	15000000	.....	.....	none	March 31, 84....	50	5375000
Osceola Con. Copper M. Co., Calumet Dis Mich	16 00	800000	50000	25	1250000	.....	.....	.....	April 1, 84....	50	1035000
Original Mining Co., Butte, Montana .....	.....	.....	60000	25	1500000	not assessable..	.....	.....	March 7, 84....	05	31 93000
Oxford Gold Mining Co., Nova Scotia .....	.....	.....	100000	.....	.....	.....	.....	.....	Dec. 10, 83....	03	10 30000
Paradise Valley Mining Co., Cal.....	.....	.....	100000	100	10000000	.....	.....	.....	March 20, 84....	19	2 20000
Pleasant Valley Mining Co., Cal.....	.....	.....	100000	100	10000000	Mar. 3, 84....	10	40000	Dec. 15, 82....	05	6 30000
Plumas Eureka Gold Mining Co., Cal.....	7 50	304687	140625	10	1406250	.....	.....	.....	October 12, 83.	50	1617175
Plymouth Con. M. Co., Cal.....	.....	.....	100000	.....	.....	.....	.....	.....	April 3, 84....	50	550000
Prussian Mining and Milling Co., Col.....	.....	.....	150000	10	1500000	.....	.....	.....	Jan. 15, 83....	10	132000
Quincy Copper Mining Co., Michigan	42 00	1680000	40000	25	1000000	.....	15 00	200000	Feb. 20, 84....	4 50	3790000
Richmond Con. Silver M. Co., Nevada.....	21 25	1147500	54000	25	1350000	.....	.....	.....	August 10, 83..	1 25	3974887
San Francisco Copper M. Co., Cal.....	.....	.....	50000	.....	.....	.....	.....	.....	Feb. 20, 83....	05	11 27500
Sierra Buttes Gold M. Co., Cal.....	6 25	765625	122500	10	1225000	paid up	.....	.....	October 12, 83.	25	1344975
Sierra Grande M. Co., New Mexico	50	200000	400000	.....	.....	.....	.....	.....	October 2, 83....	25	7 700000
Silver King Mining Co., Arizona	6 00	600000	100000	100	10000000	.....	.....	.....	Dec. 15, 83....	25	43 1300000
Standard Con. Mining Co., California	1 25	125000	100000	100	10000000	.....	.....	.....	March 12, 84....	25	80 4450000
Silver Cord Silver M. Co., Colorado	1 10	550000	500000	10	5000000	.....	.....	.....	Nov. 1, 83....	10	3 225000
St. Joseph Lead Co., Missouri.....	.....	.....	100000	10	1000000	.....	.....	.....	Dec. 20, 82....	20	22 390000
Smuggler Con. M. Co., Colorado.....	.....	.....	60000	.....	.....	.....	.....	.....	August, 83....	20	10 66700
Socorro M. & M. Co., New Mexico .....	.....	.....	2500	100	250000	.....	.....	.....	March 15, 82..	1	2 4000
Syndicate Mining Co., Cal.....	.....	.....	100000	100	10000000	.....	.....	.....	April 5, 84....	10	2 30000
Total Wreck M. Co., Arizona.....	.....	.....	.....	.....	.....	.....	.....	.....	May, 83....	1	50000
United Gregory M. Co., Gilpin Co., Col.....	.....	.....	300000	1	300000	.....	.....	.....	April 1, 83....	04	3 38250
United Verde Mining Co., Arizona.....	.....	.....	300000	.....	.....	.....	.....	.....	March 10, 84....	20	2 97500

*Shares not in market.

†Latest London quotations.

‡Price bid.

§The Deadwood has previously paid \$275,000 in eleven dividends,

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delivery of the usual Indian Supplies, duty
paid, in Manitoba and the North-West Terri-
tories, consisting of Flour, Bacon, Groceries,
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ricultural Implements, Tools, etc.

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Each tender must be accompanied by an
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ders for Manitoba, and ten per cent. of the
amount of the tenders for the North-West
Territories which will be forfeited if the party
tendering declines to enter into a contract
when called upon to do so, or if he fails to
complete the work contracted for. If the
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Tenderers are required to make up and
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[No newspaper to insert without special
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L. VANKOUGHNET,
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FRED. WHITE,
Comptroller.

Ottawa, 17th March, 1884.

THE
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—CHICAGO, ILLS.—

DUFF PORTER, Editor.

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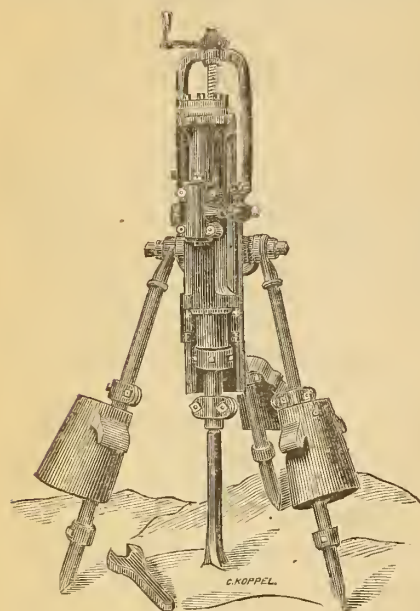
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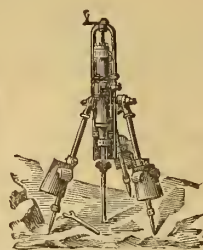
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E $\frac{1}{2}$ of N. W $\frac{1}{4}$	15	16	23	80
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CANADIAN MINING REVIEW

VOL. 2.—No. 5.

1884—OTTAWA, MAY—1884

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OFFICE:
UNION CHAMBERS, 14 Metcalfe Street.

The CANADIAN MINING REVIEW is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts as well as others interested in Canadian Mineral Lands are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 5th of the month it is to appear.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

Canada is becoming an important field for miners, and the development of her mineral resources from the Atlantic to the Pacific coasts is revealing the fact that emigration to foreign countries by Canadians who desire to engage in mining pursuits is foolish and unnecessary. If prospectors could be induced to explore the mineral bearing belts of this Dominion as carefully and assiduously as those of other countries have been prospected, they would, without question, meet with equally good success as has rewarded the searcher in any other part of the world, and, further, it capitalists in this country were less pre-

judiced against investing money in mining enterprises at home they would not be so easily persuaded to speculate in wild cat ventures in distant countries, where manipulation and scheming is unblushingly resorted to by operators over whom they can have no control. There appears to be a disinclination on the part of the wealthy men of Canada to foster and encourage the mining industries of their own country, and the consequence is that foreigners, especially Americans, are piece by piece, becoming the owners of our richest mines and mineral deposits, and the profit derived from them finds its way out of the country. For the past quarter of a century mining has been retarded by want of capital to develop the industry, and the numerous valuable deposits, long ago discovered, have been allowed to remain as nature formed them, unnoticed and untouched. When capitalists in England, on the continent of Europe and in the United States were invited to advance money for the development of our mineral resources, they, quite naturally, became skeptical as to the likelihood of such investment proving profitable, knowing, as they very well did, that there were wealthy men in the country who had money to invest in anything that would yield fair returns. These foreigners know us better now than they did some years ago, and have discovered that the cause of our mineral wealth having been so long neglected has been due to lack of enterprise on the part of those who possessed the means of developing it. In Nova Scotia the best

paying gold mines have fallen into the hands of Americans, and a large proportion of her coal area is owned and worked by foreigners. In the Province of Quebec the richest asbestos mines, with one exception, and some of the best gold mining privileges in the Beauce and Chaudiere districts are controlled by Americans, and all of our richer phosphate mines, in the same province, are owned by American and English organizations. In Eastern Ontario the gold and iron mines that are now attracting so much attention have become the properties of our enterprising neighbors, or controlled by them, and are being developed with their capital. Those copper mines on the north shore of Lake Superior that are now being worked are owned by English companies, and Silver Islet, from which millions of dollars in profit were derived, was allowed to fall into the hands of American capitalists, and they are rapidly acquiring the most valuable of the mineral locations and mines in the vicinity of the "Rabbit Mountain" and "Huronian." Further westward, at the Lake of the Woods, and beyond, in the Rocky Mountain district, Canadians have shown rather more enterprise than elsewhere, and yet, even here, they would rather sell than work the mines. In British Columbia the mines are owned and worked by people of various nationalities.

A misfortune which has long been felt in this country is that the enterprising Canadian has not the means to advance and develop our mining industries, and the capitalists have not the enterprise to come to his assist-

ance, consequently we have been, and are now depending on capital coming in from other countries, and, though it is coming freely, we require much more if justice is to be done to our mineral resources.

The lecture delivered by Dr. Dawson, of Montreal, on his Winter's geological work in Egypt and Syria, before a crowded meeting of Victoria Philosophical Institute, held at the Society of Arts House, has been printed. Diagrams of the caves and a collection of flint instruments and bones, the latter classified by Professor Boyd Dawkins, F.R.S., were exhibited. As to the Syrian caves, they afforded a remarkable evidence of being inhabited by men of splendid physique, at a time when the Mediterranean must have been a small sea and one could pass from Syria to Greece on land. Between these and the modern or Phœnician inhabitants there was evidently a break.

MINING REGULATIONS FOR THE NORTH-WEST TERRITORIES.

These regulations, published during last session of Parliament by the Dominion Government, have been the subject of much comment and correspondence in the press of the North-West since they came into force. Many of the clauses have been severely criticised and exception has been taken to the terms exacted for the securing of certain mining claims. It must be admitted as an impossibility to frame any rules and regulations that would meet the views of everybody, and it will be necessary to patiently await the result of time and experience, which will, doubtless, bring about modifications and amendments that will be acceptable to the majority at least, if not to all. Notwithstanding the many letters and newspaper articles that have been written on the subject, in not a single inst-

have we seen a suggestion offered as to what changes are desired. It would be a wise move on the part of those who are most interested in the section of country most affected by the regulations, and who have practical knowledge of such matters, if they were to meet together and formulate their complaints and forward them in a businesslike and proper manner to the Minister of the Interior, pointing out to him the objectionable clauses and the nature of the modifications wished for. Such a communication would doubtless be carefully considered by the authorities at Ottawa and acted on.

DISTINGUISHED VISITORS.

Vice-Regal Excursion

TO THE

RIVIERE DU LIEVRE PHOSPHATE DISTRICTS.

On Monday morning, the 12th inst., His Excellency the Governor-General and suite, accompanied by Dr. J. A. Grant, left the Union Station, Ottawa, on the 8.30 train for Buckingham, and on arrival there found carriages awaiting them to convey the party to the village. Without loss of time they proceeded to the wharf on the Riviere du Lievre, where the *Rocket* was in readiness to receive the distinguished passengers.

Shortly afterwards the tidy little steam yacht, owned by Mr. W. A. Allan, of Ottawa, and used by him in connection with his phosphate mining, steamed off on her journey up the river.

The weather, fortunately, was all that could be desired for such an auspicious occasion, and all being in the best of spirits the voyage was indeed an enjoyable one. The natural beauties of the winding river, with its bold and wild scenery, gained frequent bursts of admiration from the entire party. Indeed, with every turn or bend in the river, a new vista was opened up, the effect being quite panoramic.

As the little craft sped on up the stream, time seemed to fly, and soon a point was reached where the miners were at work, and here the occasional blasts had a curious meaning, sounding indeed as a royal salute, though we are not prepared to say we actually counted 21 explosions. Though told that dynamite

was used in this district, it did not appear at all to terrify the guests of the day.

As the yacht crept up the river still higher the scenery became more imposing, and when High Falls appeared in sight, only those who have been fortunate enough to have seen them, can well imagine how His Excellency and party were impressed.

Here a delay was made in order to allow the tourists ample opportunity of viewing the Falls and admiring the whole scenery, here so grand. The *Rocket* was started on her return trip, and with the current, seemed to fly down the river. In due time Buckingham was reached and the party proceeded to Ottawa by C.P.R. train, arriving at the station at 6.30 p.m.

His Excellency and party thoroughly enjoyed the trip, and were loud in their expressions of gratitude to all those who were instrumental in rendering the whole day such a delightful one, and the object of the trip so successful. We are quite sure it will be long remembered.

Mr. Baker, Superintendent of the C.P.R., kindly placed the President's private car at the disposal of His Excellency for the occasion, and provided a special train from Buckingham.

Mr. McLaren and Mr. Benardin, of Buckingham, very kindly provided the carriages used to convey the party to and from the Buckingham station.

Mr. G. Smith, Manager of Mr. Allan's *Rapids* Mine, acted as skipper of the *Rocket* on the auspicious occasion. His Excellency's only regret was that time did not permit of his landing at some point on the river and witnessing some of the phosphate mines in actual operation. A second trip with such an object in view will be a pleasant anticipation.

Mr. Childers, of the British House of Commons, has computed the gold coinage of England, since 1817, at £300,000,000.

Gold was first discovered in California in 1848, and during the eight years following, that State and the colony of Australia sent \$800,000,000 in gold to Europe.

During the past fiscal year Canada imported coal and coke valued at \$6,389,804 and manufactures of iron and steel to the value of \$13,714,636, the largest items in her imports.

THE ROYAL SOCIETY OF CANADA.

Some Interesting Papers Read at the Recent Meeting.

This Society, founded by the Marquis of Lorne, held its third meeting at Ottawa during the present month. Some of the prominent members who were unable to be present forwarded papers which were read during the meeting, and a large number of contributions came from outside sources.

The Marquis of Lansdowne accepted the position of patron and honorary president, and the officers elected for the ensuing year were as follows:—President, Dr. T. Sterry Hunt; Vice-President, Dr. D. Wilson; Honorary Secretary, John George Bourinot (re-elected); Honorary Treasurer, Dr. J. A. Grant (re-elected).

Dr. T. Sterry Hunt read an interesting paper, "The origin of Crystalline Rocks." He remarked that the problem of the origin of those rocks, both stratified and unstratified, which are made up chiefly of crystalline silicates, is essentially a chemical one, and traced their origin, elements and processes of decay and disintegration.

Professor E. J. Chapman laid two papers on the table, "Contributions to our knowledge of the Iron Ores of Ontario," and "Some deposits of Titaniferous Iron Ores in the Counties of Haliburton and Hastings." Some portions of these papers corroborated many of the statements made in a *continued* article in the *January, February* and *March* numbers of the *REVIEW* entitled "The Iron Deposits of Central Canada."

A paper of Mr. Edwin Gilpin, of Halifax, "The Manganese Ores of Nova Scotia," was read, in which the author, after remarking on the localities yielding the more common variety of manganese ore, takes up the best known of the manganese ores, prolusite. He states that Hants, Pictou, Colchester and Cape Breton Counties seem to yield it most abundantly, and minutely describes its occurrence at Panny Cape. The writer also gives analyses of the ores of these localities as well as of those of the Cape Breton and Magdalen Island deposits.

As the result of his surveys and investigations, Mr. Gilpin gives it as his opinion that the manganese ores of Nova Scotia occur low down in the carboniferous limestone, below the gypsum deposits characterizing that horizon, and that they are

connected with limestones frequently manganiferous and usually so magnesian as to approach dolomites in composition, and submits several analyses of these limestones. The paper forms the first detailed description of the manganese ores of Nova Scotia, which are of unusual purity, and is of practical value to those engaged in mining them, as the writer points out the geological horizon carrying them most abundantly.

NORTH CAROLINA PHOSPHATE.

Much importance is now being attached to the comparatively recent discoveries of phosphate rock in North Carolina, and, notwithstanding the low grade of the mineral itself and the peculiar nature of the beds, as compared with our Canadian apatite deposits, these discoveries are looked upon as of the greatest value to that State. The *New York Engineering and Mining Journal*, quoting from a report of Dr. Charles W. Dabney, Jr., Doctor of the Agricultural Experiment Station at Raleigh, says: "Dr. Dabney states that the phosphatic rock is found in two different relations in this field, the lower country yielding worn nodules imbedded in comminuted shells, forming a conglomerate; while in the upper country it is found in larger nodules, cakes, or slabs imbedded in sand. In the former district, the conglomerate crops out in places, while in other localities it is covered by limestone, the thickness of the phosphatic bed reaching four feet. Analyses of samples of the nodules yielded from 14 to 42 per cent. of phosphate of lime, equivalent to about from 6.25 to 19.25 per cent. of phosphoric acid. It has been suggested that a good plan to treat the conglomerate rock would be to burn it, so as to slack the lime and thus reduce it to powder, while the nodules remain comparatively unaffected, so that they can be screened out. In the up-country, embracing Sampson, Duplin, and Onslow counties, the rock, which occurs in a horizontal bed from 6 to 20 inches thick, is covered by marl and sand sometimes to the depth of 20 feet. This rock yields, according to a number of analyses made, from 32.5 to 50.5 per cent. of phosphate of lime. From a test pit near Warsaw, three-quarters of a mile from the railroad, 46 tons of workable phosphate, running nearly 40

per cent., were taken from 0.11 acre, or at the rate of 418 tons an acre, at a cost of only \$3 a ton on cars, in spite of necessarily crude arrangements. A portion of the rock was experimented with at the works of the Navasse Guano Company, and it was found that 1000 pound charges required only from 600 to 650 pounds of acid, as compared with 900 pounds for South Carolina phosphate, the product containing from 10.78 to 11.63 per cent. of soluble phosphoric acid, from none to 0.67 per cent. of reverted phosphoric acid, and up to 1.35 per cent. of insoluble phosphoric acid. The crude rock treated was not even thoroughly treated. These results are certainly very gratifying, and give promise of the development of an industry very important to North Carolina, and are highly creditable to the vigilance and enterprise of those in charge of the Experiment Station."

When it is considered how vast are the apatite deposits in Canada, and how low is the cost of mining, together with the fact that the mineral will assay 80 to 85 per cent., in cargo lots, if carefully pressed, compared with 32.5 to 0.5 per cent. as above, increased demand for phosphate locations is not to be wondered at.

PHOSPHATE MINING IN OTTAWA COUNTY.

At the mines east of the Gatineau and on the east and west sides of the Riviere du Lievre, operations are going ahead with more than ordinary activity, and mineral is being raised in great quantity. During the past year important improvements have been made on any of the locations in the form of comfortable and substantial buildings, erected for the accommodation of the miners, suitable stables, blacksmith shops, engine houses, and neat cottages, the latter being occupied by the managers of the mines as dwellings and offices. Steam drills, hoists and pumps are now in use where a year ago all work was done by hand power. Airways have been laid from the mines to the dumping grounds, over which the ore and waste can be readily removed in cars which now take the place of wheelbarrows that were used a year ago; good summer roads are graded from the mines to the Riviere du Lievre which afford facilities for forwarding the ore during the summer to the river bank, from whence it is carried in scows to Buckingham and there transhipped and forwarded to the point of shipment. Formerly it was necessary to allow the ore to accumulate at the mines

until such time as winter transportation should be rendered practicable. All of these changes have taken place during one short year, it may be said, and are due to the introduction of capital, practical ability and an element of enterprise, which have given an impetus to the industry and supplied a want long felt in the district. It is now less expensive to raise the ore, the output is rapidly increasing and the cost of transportation has been materially reduced. In short, the phosphate mining industry of Ottawa County has a most promising future, and was never in such a flourishing condition as it is to-day.

THE MINES.

In the Township of Portland, West, the *High Rock* mine, the property of the Phosphate of Lime Company, and the Union Phosphate Mining and Land Company's *Star Hill* mine are each giving employment to a large force of miners, and phosphate is coming to the surface in large quantity. So much has already been said of these mines in the REVIEW that their value must be well known. They are thoroughly equipped and well managed.

In the Township of Portland East, the *North Star* mine, owned by the Dominion Phosphate Company, has much improved during the past few months and an abundance of high grade ore is daily raised, mining operations are systematically conducted, and the mine is supplied with every facility for carrying on work to advantage. Last year's output from this property is now being shipped to Hamburg, and there is no doubt the whole will return 84 per cent. The ore has been carefully dressed and is of a high grade.

The *Rapids* mine, owned by Mr. W. A. Allan, has been put in good shape during the past few months by Mr. George Smith, Mr. Allan's manager, and a quantity of very fine ore has been piled up. Actual mining on this property has been retarded by a delay in getting the machinery on the ground. It has been recently delivered, however, and is now in course of erection, and when this has been completed, active operations will be proceeded with.

The *Lansdowne*, adjoining the *Emerald*, now the property of the Dominion Phosphate Company, is being thoroughly prospected under the personal supervision of Mr. W. H. Smith, the company's manager, and many valuable deposits have already been exposed. On the west side of the property, facing the Riviere du Lievre, a large body of ore has been uncovered, and the indications are that it will prove to be of vast extent. The company is to be congratulated on its purchase of this location.

In the Township of Buckingham the *Emerald*, belonging to the Ottawa Phosphate Company, is the pride of the County. The mine itself appears to be in a body of phosphate, the extent of which has not yet been defined, capable of yielding many thousand tons annually for years to come. The mining captain in charge is a man of wide experience, as his work has shown, and Mr. S. P. Franchot, the genial business manager, and one of the directors of the company, has so systematized each department that everything goes ahead apace without hindrance and like clock work.

The force employed at the mines above mentioned and the daily output of each has not varied since our last report.

In the Townships of Templeton and Wakefield the mines are producing a large quantity of mineral, and preparations are being made to open new ground almost immediately.

TRANSPORTATION OF ORE.

From the *High Rock*, the *Star Hill*, and the *Emerald* mines, phosphate is being forwarded daily to the points of shipment, and the large piles which have accumulated at the railway stations and at points on the Ottawa River since the close of navigation last year are being reduced by shipments to Montreal, by rail and barge, respectively; from which port the ore will be forwarded across the Atlantic.

Phosphate Quotations.

The market continues dull and buyers are not offering such liberal prices as producers have been looking for. Nevertheless several sales have been recently reported at prices in lots that will establish a price for this season's shipments at one shilling a unit for 70 per cent. mineral, with one-fifth of a penny rise. For those who ship direct this, with the ruling low rates of freight, is quite equal to 1s. 3d. per unit for 80 per cent. with freight at past years rates.

FREIGHTS.

Owing to the scarcity of outgoing freights this season the phosphate shippers are deriving the benefit of unusually low rates. For some seasons past the rates have ruled at from ten to fifteen shillings, from Montreal to Liverpool. Shipowners are now offering tonnage to Liverpool and London by steamship at from three to six shillings.

At Tunora, New South Wales, a gold nugget was recently found which weighed 183 ounces and was valued at about \$3,300.

APPOINTMENT OF A SUPERINTENDENT OF MINES IN THE NORTH-WEST TERRITORIES.

Owing to the threatened influx of prospectors and miners to the mineral sections of the Rockies, and the probable impetus it will give to mining in that district, the Government has appointed a Superintendent of mines, and we understand that Mr. W. Pearce, Inspector of Dominion Land Agencies, has been selected for that position. The Superintendent of mines, under the new mining regulations, will be vested with authority to adjudicate all disputes that may arise among mine owners and will have a general supervision over all mineral locations.

MICA MINING IN CANADA.

During the past year some important discoveries of this valuable mineral have been made in Eastern Ontario and in Ottawa County, Province of Quebec. In the township of Loughboro' mining has been started on a property that, it is said, will yield fair merchantable mica. Mr. Allan's mine in Burgess has turned out a large amount, some of which has been cut into plates 10x6, and the mine is capable of yielding an almost unlimited quantity. The output of the mine is being regularly shipped to the American market and to dealers in Canada. Mr. Allan has some men engaged in opening up a property in Ottawa county, discovered late last autumn, which promises to develop into a mine of great value. The crystals are large and the quality of the mica is equal to any that has ever been mined in North Carolina or New Hampshire.

Phosphate of lime (apatite) was first discovered in Burgess, Ontario, in 1847. In 1860 the first shipment of the mineral was made, amounting to about 100 tons.

The earliest discovery of apatite in the County of Ottawa, was made in 1829, by Lieut. Ingall of the 15th Regiment, while engaged in certain geological explorations. Mining operations were not engaged in until 1873.

The entire phosphate beds of South Carolina, so far as discovered and defined, have been estimated to cover an area of 240,000 acres; it was not known that the rock possessed any commercial value until the year 1865.

Mineral Wealth North of Lake Superior.

A correspondent of the *Chicago Mining Review* has recently written a letter to that journal under the above heading, and, at the request of some of our subscribers in the West, we take pleasure in re-printing it, as follows:—

"PORT ARTHUR, ONT.—The successful working of the Huronian Mining Company's gold and silver mine at Jack Fish Lake; the continuous production of both high and low grade ore at that mine; the satisfactory tests by its own mill, and the elaborate preparations for the continued working of both mine and mill in the future on a large scale, the recent purchase by the Vice-President of that company of the two adjoining localities, one on either side on the same lode, equally promising, for a large sum of money, the very recent developments at the Rabbit Mountain silver mine which showed it wonderfully rich and which produced many large nuggets of silver, some weighing as much as six pounds, the shipment of a car-load of \$645 per ton surface ore taken from the first ten feet of the shaft as it came, without selection, the agreements for the sales of the mines comprising four one hundred and sixty acre locations on that lode to two American syndicates for \$400,000, and of 96 T., another 160 acre location on another vein in the vicinity, for \$60,000, to an American capitalist, and of 97 T., of similar size on still another vein in the neighborhood, for \$60,000 to another American capitalist, the negotiations in progress for the purchase of other properties in that region of country, the arrangements made for active work on the opening of navigation by a strong Canadian company, at the Partridge Lake gold mines, the refusal of \$20,000 offered for the Slate River mine, the arrangements being made for the Laurentian Mining Company to commence explorations on their gold, silver, copper and other mining properties in this district, the organization of a new, strong company to handle the old Thunder Bay Mining Company's extensive properties, the developments made by Mr. Hasting in the silver slates on the north side of the Traministiguia River, the continued large workings of the copper mines at Michipicoten and Mamainse and the explorations being made at various points along the lake coast, are facts among the results of the winter's work which can now be pointed to with satisfaction as bringing into prominence the North Shore of Lake Superior as a desirable and convenient mining field.

And why should this not be so? The above references are practical instances of accomplished facts. Let us examine further. Enough has appeared in the columns of the *Mining Review* of the geology of the country, to show that in this mining field we are surrounded by the mineral-bearing rocks so highly prized by the miner and which ought to produce the economic minerals in paying quantities. Enough has also appeared to establish the fact that these rocks are traversed by many dykes and numerous true veins. The instances which have been given of the mineral-bearing qualities of some of these veins are genuine evidences of their value, and they point to the advisability of their further development and to the advisability of further explorations to find and locate others. A very small portion of the country has been explored, and yet some very valuable mines have been discovered. Are there not others just as good? Believing as we do in the old saying that "there are as good fish in the sea as ever were caught," may we not expect by applying the fisherman's doctrine to mines, to hear of other discoveries of equal and perchance of greater value, as the explorers get over the ground? There is a great field for practical explorers, but in this country they require some capital.

The mineral bearing country extends a long distance. The varieties of minerals to be found are numerous. The Indians, who know the country best, could, if they would, point out many valuable mines but they have a superstition on this subject and as a rule they will not divulge what they know. It is a well-known fact, however, that the best mines on the main land have been pointed out by Indians. Notable among these are the Huronian, the Rabbit Mountain, the Partridge Lake, and the Zinc mines. The Christian and better civilized Indians can sometimes be prevailed upon for a consideration to show a mine, but they will more often deceive and disappoint an explorer, occasionally in consequence of their greed, but more generally on account of their fear.

The Indians in their time have been badly fooled by the white men. Extravagant promises have been made them which have never been fulfilled, or when promises made have been partly fulfilled their bounty has been purloined from them. Great and often unnatural mining stories frequently come from far off lands, and by some people are believed. It is more difficult for capitalists and every class of men to realize that such treasures as are to be found in this district are so near and convenient to their homes. If the stories were told which could be told of this region of country they would not be believed because they did not come from some fanciful distant El Dorado, and yet probably finer specimens of gold bearing quartz, native silver and silver ore, besides copper and copper ore,

iron ore, galena, zinc blende and baryta, have come from this district than from any other on the American Continent, if we except the native copper specimens of the South Shore. Finer free gold specimens may be shown from other mining fields, but we challenge comparison with the rich sylvanite ore which the Huronian mine produces. The sylvanite ore of this mine is one of the rarest and most valuable minerals known to miners. The free gold specimens from the Partridge Lake mine taken to the Centennial Exhibition compare favorably with those of any country. The native silver which was taken from Silver Islet cannot be excelled by any mine's production. We doubt if any silver mines ever surpassed in richness the nuggets of the black sulphide of silver which came from the Rabbit Mountain mine and the mines we have referred to in that neighborhood. Our copper ore was thought worthy for the Paris Exposition. Our specular iron ore has not been surpassed to our knowledge, and a man would have to go far to find finer specimens of galena than have been found in this district. We know of no better zinc blende ore on the American Continent than is to be found here, nor have we seen in the manufactories where baryta is used such specimens as can be procured from our veins. These instances are of known deposits. As to the unknown, it is no new story in this district when an Indian speaks of a mountain of iron, or vein of silver from which he can cut silver bullets for his rifle, but it is another thing to get him to show it. Our few mining men are old soldiers in mining discipline and have been "under fire." They do not easily get excited. They have been accustomed to seeing and handling both the precious and base metals, and mineral bearing veins do not unnecessarily excite them. Hence it is that the country is not subjected to a wild and extravagant excitement. That period has passed over this district and it is fortunate that it has, because we are now getting down to solid, practical work, and beginning to compare the size of our veins with those of other countries, to estimate the cost of mining by the ton, and to calculate the value of our yield by large mill tests. We can afford to let the raw recruits of the army of mining speculators go to the Rockies or other distant lands where the first discoveries of the precious metals create undue excitement, and a rush of fortune seekers who know not a true fissure from a gash vein, or the average value of a lode when found, or the proper methods and cost of working the different kinds of ore. This district has had all that excitement. What we now need is more practical mining men and capital to make productive our veins of low grade ore. It has been in the past the misfortune of this district that several promising properties have been held by speculators or land owners who neither know the real value of their holdings, nor would take the necessary steps to ascertain it. But now parties who have been holding properties expecting others to make them valuable by developments in their neighborhood, are awakening to the knowledge of the fact that as every tub must stand on its own bottom, so must every mining venture, and that therefore some development is essential to every mining property having any promise. The time for selling a mine in this district on a pocket specimen has passed away, and men are not now so easily misled by assays. If people are inclined to compare this country with those from whence come stories of new fields of silver ore assaying from ten to fifteen thousand dollars per ton, we can point them to the mines in the Rabbit Mountain district, and to many veins from which assay samples can be had which will far exceed that by having only a rich nugget specimen assayed.

We have seen in the public press statements that new gold discoveries have been made where the ore assays from twenty to thirty thousand dollars per ton. It would be an easy matter to get assay samples from either the Huronian or Partridge Lake mines, which would assay over one hundred thousand dollars per ton. Yet instances like these are no indications of the value of the lodes. The Huronian mine is a reliable steady producer. It is a large well defined lode with clean cut walls, having the gold evenly disseminated throughout the veinstone. Its average mill work does not yield over \$35 per ton, yet it is considered a most valuable mine. Dr. Selwyn, the Director of the Geological Survey of Canada, visited it last summer and pronounced it, in reporting to his government, the most promising mining venture of the district. It is but fair to say, however, that although at that time he had visited the Rabbit Mountain mine he had no opportunity of expressing his opinion on the more recent developments made at it and on the other veins in that region. The car load of surface ore from the Rabbit Mountain mine recently shipped, averaged to the smelters in Newark, N. J., and realized to the owners, \$645.41 per ton. This speaks volumes for this mine, especially when it is known that ore averaging \$10 per ton from its large vein, if concentrated and treated on the spot would pay handsomely. The 96 T. and 97 T. veins are equally promising, although not quite so large. They have each produced ore assaying over \$250 per ton. The instances given of other veins in former articles which appeared in the *Mining Review* have resulted in enquiries being made about them from various practical and experienced quarters, thus demonstrating that this country is beginning to possess the attractions of a legitimate and profitable mining field. Other instances could be given, but those which have been mentioned are

sufficient to invite curiosity and bring the country into notice. Every mining venture in this district cannot be expected to be a success, but the ones referred to are very likely to be. It is a wonder that a country so conveniently situated to the markets for bullion and base metals, and possessing such an admirable mining law, where land not already taken up can be purchased from the Government by either a citizen or a foreigner for \$1 per acre, where there are no royalties or other crown dues on the minerals, where labor is so cheap, mining timber and water so abundant, and where the climate is so healthy and invigorating, should have remained so long but partially explored and almost wholly undeveloped."

The "Huronian" Mine, at Jack Fish Lake, is owned chiefly by gentlemen of Ottawa. (Ed. C.M.R.)

CANADA CONSOLIDATED GOLD MINE.

This property is situated in the County of Hastings, Province of Ontario, and has been the subject of frequent enquiry for some time past by people who are more or less inquisitive as to its industrial condition. The opinions which have been expressed by Mineralogists, Mining Engineers and other scientific men would lead to the conclusion that the mine is capable of producing ore in abundance, carrying gold in paying quantities, but, strange to say, although an incredible amount of money has been expended on its development and equipment the property has been a source of heavy loss to its owners. Some months ago the company leased the mine to a syndicate who have ever since been working it at a loss, and who are naturally enough becoming dissatisfied with the results, and it is therefore not unlikely that a change will take place in the near future and work will be proceeded with under some new organization. The true secret of the trouble, up to the present time, has been mismanagement, for, although there is abundance of ore that, as scientific men have invariably pronounced, can be profitably worked, those who have conducted operations have failed to realize any profit. Recently the monthly expenditure has reached \$7,000 and the returns \$4,000, shewing a monthly loss of \$3,000, and it is to be supposed that the present lessees are incapable of overcoming the difficulty. During the present month Mr. Eugene Coste, M.E., a graduate of the National School of Mines, Paris, and a gentleman of recognized ability, visited this mine and, on his return to Ottawa, expressed himself very favourably impressed with the property as regards the amount of ore that can be mined. Mr. Coste has given it as his opinion that the mine is a very valuable one, capable of yielding gold in paying quantity, but that up to the present time a proper method for treating the ore has not yet been adopted. He has returned to Hastings to further investigate the mines in the district for the Geological Survey, and while in the neighborhood it is to be hoped he will find an opportunity to visit the Canada Consolidated and offer to those in charge such advice as his scientific knowledge and experience may suggest.

GOLD MINING IN NOVA SCOTIA.

The total yield of gold for the year 1883, according to the official report of the Department of Mines, was 15,446 oz., 9 dwts., 23 grs., being, with the exception of the year 1877, the largest return since the year 1871, when a production of 19,227 oz. was recorded. In the year 1865 there were 24,423 tons of quartz crushed, yielding 25,454 oz., 4 dwts., 8 grs., equivalent to 1 oz., 20 grs. per ton, the average earnings per man amounting to \$2.15 per day; whereas, during the past year, there were 25,954 tons of quartz crushed, which returned 15,446 oz., 9 dwts., 23 grs. of gold, equivalent to but 10 grs., 21 dwts. to the ton, while the average earnings per man amounted to \$2.84 per day, showing that, while the quartz mined in 1865 was one hundred per cent richer in gold than that mined during 1883, the men employed during the past year actually earned more money individually for the owners of the mines. This is, of course, attributable to the increased facilities for mining and treating the quartz advantageously and to the value of experience. The richest returns last year were made by the Gallagher Gold Mining Company, in Stormont, and the Oxford Gold Mining Company at Chezetcook; the former extracted 1,917 ounces from 551 tons of quartz; and the latter 2,494 oz., 5 dwts. from 1,475 tons of quartz, an average yield of 1 oz., 13 dwts., 10 grs.

The result of last year's operations in the gold districts of the Province goes to show that by employing suitable mining plant and machinery best adapted to treating the ore, and by studying economy in the management of mining and milling, the numerous mines of Nova Scotia can be made to yield profitably.

The stock of the Calumet and Hecla Mining Company has declined to \$172 per share.

The first discovery of gold in Hastings County, Ontario, was made by Mr. C. Robb, M.E., in 1864, while engaged in a mineral exploration for the Canada Company. The specimens were assayed by Dr. A. A. Hayes, of Boston, Mass.

NOVA SCOTIA MINING NOTES.

In the matter of the Salmon River Gold Mine entitled on the docket *Manley & Fielding vs. Mott et al*, Judge Thompson last week gave judgment in favor of the defendants, thus confirming them in possession of this valuable property. It is rumored that the plaintiffs intend taking out an appeal, but the general opinion among mining men is that the matter had better be allowed to rest as it is. There is a feeling that this decision will benefit our mining interests by putting mining claims on a more secure basis than heretofore, and that thus investors from abroad will be more ready to put their money into our mines.

The Salmon River Gold Mining Company of Nova Scotia has just added eight more stamps to its mill, increasing the number now running to forty-three stamps. This company started about three years ago with five stamps, and has been steadily increasing its crushing power as the mine has developed. The main vein is from 2½ to 9 feet in width, and mills from \$10 to \$100 per ton; the cost of mining and milling is \$2.50 per ton. All machinery is driven by water power.

Some five years since a prospector discovered in the Cariboo district, Moose River, a number of boulders that gave indications of coming from some rich lode in the vicinity. He proposed calling the lode, when it should be discovered, the Lake lode. Search has been carried on more or less vigorously, but persistently, during the intervening period but without success, till a few days since when it was found. The surface indications are that it will yield at least two ounces to the ton of ore.

Mr. William Bruce, the lessee of Mr. Torquay's mine at Moose River, Cariboo, came to Halifax on Monday, May 12th, bringing with him a brick of gold from that mine weighing 49 ounces and valued at \$930. It was the result of the work of seven men during April, and was extracted from about 60 tons of ore. —*Halifax New Era*.

Promising gold discoveries have been recently made in Hants County, N.S. A gentleman was in Ottawa not long since and exhibited some very handsome specimens of quartz which he had brought with him from the district.

A recent examination of the Coxheath ore (copper) by a New York mineral expert has led him to make a most favorable report to the company.

Holt City is said to be the headquarters for the Rocky Mountain prospectors, and parties are daily leaving there for the mineral districts. Others are organizing, and the mining fever is at its height.

GENERAL MINING NOTES.

The main shaft at the "Pine Portage" mine, Lake of the Woods, has reached a depth of about 70 feet, and a six stamp mill is at work. The quartz is yielding gold in paying quantity.

It is reported that in the vicinity of Silver City, N.W.T., there are excellent indications of alluvial gold and that placer mining will, in all probability, be proceeded with vigorously.

From 1858 to the close of 1883 the province of British Columbia produced \$47,935,963 in gold. In 1864 the yield was \$3,735,850, the highest in one year since gold was discovered in the province, while the lowest yield was that of 1883, which only reached \$794,252.

We have not received our monthly report from the Beauce gold mines, but were pleased to learn from a gentleman who was in Ottawa recently and had just come from the district that work was progressing satisfactorily and that the mines in operation were paying handsomely.

Mining operations at the Lake of the Woods are at a standstill. This district is rich in ore, and would compare favorably with some of the best known mineral regions of the United States, but owing to the lack of the necessary capital miners have been unable to work their claims continuously or to advantage.

A telegraph despatch from Winnipeg states that samples of silver ore from the Rabbitt Mountain mine have been received at the C. P. R. Land Commissioner's Office. The largest specimen contains, according to the assay, \$10 worth of silver, and would yield \$4,600 per ton. The silver is mixed with 13 per cent. of sulphur. There are also specimens of silver-bearing rock which would yield \$3,600 per ton.

Sierra Nevada Gold and Silver Mine.

An interesting illustration of how the value of mining stocks in the United States has been affected by manipulation is contained in an article which has appeared in the *New York Mining Record* as follows:—

"In September, 1879, the stock of this company (Sierra Nevada) was sold up to \$270 per share and at prices ranging between \$68 and \$270.

no less than 53,644 shares changed hands. During the following month as many as 28,613 shares were sold at prices descending from \$260 to \$135, while during November, 1879, as many as 161,052 shares were sold in San Francisco at prices ranging between \$200 and \$38. During May the same year the same stock had sold as low as \$2.75, and 49,715 shares had changed owners at prices ranging between that and \$5, while during July, 1879, as many as 157,703 shares had sold for prices ranging between \$5.12 and \$11.12, and during August sales were made as low as at \$10.87. This appreciation of the stock within forty or fifty days of \$259.13 per share was manipulated in a manner and by means and methods the immorality, or rather criminality, of which was greater or more harmful, under every aspect, than the acts of the highwayman or of the burglar; for at bottom, the appreciation of the price of the stock in a few weeks of some \$250 per share which was known to be valueless to those who effected the appreciation was as much a planned robbery of those duped into the purchase as if the same men had conspired to acquire the same money by the robbery of the several banks in which it may have been deposited immediately previous to being withdrawn for payment for Sierra Nevada stock during September, 1879.

Be this as it may, since September 1879, when the stock was thus inflated by carefully contrived false representations, reports of an uncovered bonanza—not as much as \$250,000 have been extracted (during 1880 and 1881) from the mine in gold and silver while no less than \$2,150,000 have been extracted from the pockets of the stockholders upon the pretext of searching for the bonanza which, we repeat, was asserted positively to have been found at least as early as the middle of September, 1879. Under such circumstances we can imagine nothing more fatuous, nothing more unjustifiable, than the further expenditure of one cent of money in the hunt for ore at any such depth as 3,100 feet. No fact can be more unquestionable than this, that at no time since 'labor's thousand arms of sinew and of metal all-conquering' have been wisely exploring the recesses of all parts of the earth for gold and silver, no amount of either metal worthy of note has been taken from below 2,000 feet; and for that matter, the greater part of both as yet won from the earth, have come from a depth above 1,000 feet."

PERSONALS.

Mr. S. P. Franchot, a Director of the Ottawa Phosphate Company, has recently returned from New York, after an absence of nearly three weeks, and is now attending to the Company's interests at their famous *Emerald* mine.

Mr. Pickford, President of the Phosphate of Lime Company, London, England, was in Ottawa during the month, en route to the Company's *High Rock* mine in the Township of Portland West. Great changes have taken place in this phosphate mining district since Mr. Pickford's last visit to Canada.

Mr. W. H. Williams, President of the Union Phosphate Mining and Land Company, was in Ottawa in the early part of May and proceeded to the Company's property in Portland West. Mr. Williams had not long returned from England, having gone there to dispose of last year's output of the mines.

Mr. F. J. Falding, of New York, who has for some time been identified with Canada's phosphate industry, returned to Ottawa during the month, after an extended trip through the phosphate district. He gave it as his opinion that the mines were never looking more promising than at the present time.

PROTECTING IRON ORE

IN THE UNITED STATES

In connection with the effort that has been made by the iron manufacturers of the United States to have foreign ore placed on the free list, in opposition to the wishes of the ore producers, the *N. Y. Mining Record*, in a late issue has the following:—

"Perhaps there is no man in this country more thoroughly conversant with the needs of the iron mining industry than Hon. Geo. H. Ely, of Cleveland, who was invited to make an argument in behalf of that interest before the Ways and Means Committee of the House. His views on the Morrison tariff bill, which proposes putting iron ore on the free list, are given below, as expressed to a correspondent of one of the Cleveland papers:—

"I consider that such an abolition of the duty would irreparably injure the very extensive, intimately connected, and interdependent industries now based on the Lake Superior iron ore production. Morrison considers iron ore raw material. So it is, dormant in the mine, but the moment you apply labour and capital to it, it is a product of industry as much entitled to protection as steel rails or woollen goods. The Marquette and Menominee districts alone have \$51,000,000 employed in mining ore, and both districts support 50,000 people, and the capital employed in railroads and steamers for transporting ore to our furnaces and mills amounts to over \$30,000,000 more. American miners receive over two dollars per day; Spanish miners forty-five cents. To place foreign ore on the free list would be to strike a blow at American labour and American industries. The United States contains every variety of iron ore, favourably distributed and in inexhaustible quantities.

American labour and American capital should be protected in the process of utilizing these enormous values, which otherwise would be useless under our soil. Of course it would be supreme folly to depend on any foreign nation in the remotest degree for a product lying at the basis of American iron and steel industries, now so large as to almost control the industrial and financial affairs of our country. The North-West and Cleveland should be alive to the threatened disaster."

Cost of Producing Pig Iron.

The *Iron Trade Review*, of Cleveland, O., quoting from a letter of Mr. J. B. Moorhead to the Ways and Means Committee, of Washington, and from Mr. Joseph D. Weeks' series of articles, which appeared in the *Philadelphia Press*, has drawn some interesting comparisons concerning the cost of producing

pig iron in the Cleveland district of England and in the Lehigh Valley of Pennsylvania, as follows:—

Raw Material.	England	Lehigh Valley.
Ore	\$4 09	\$9 10
Coke and Coal.	3 20	5 50
Limestone	45	1 00
Labour, Running Repairs, etc.	2 25	2 70
Total cost per ton..	\$9 99	\$18 30

And adds that probably the divergence in the above figures would be still greater were the items of renewal of plant and interest on investment added to the totals. It should be remembered, however, that there are other localities in this country more favourably located for iron manufacture than the Lehigh region; nevertheless the fact remains that, because of cheap labour and exceptionally favourable facilities, English manufacturers stand as a constant menace to the iron furnaces east of the Alleghenies.

For the information of those of our readers who have invested in U.S. Mining Stocks we publish the following:

ASSESSMENT DIRECTORY.

(N.Y. Mining Record.)

This table is prepared from the official advertisements published by the organ of the San Francisco Stock Exchange.

[Stocks are sold in New York with assessments paid fifteen days anterior to the date of delinquency at office of the Company, as given in the table below.]

Name of Company.	No.	Amount.	When Levied.	Delinquent in Board.	Delinquent in Office.	Day of Sale.
Sierra L & I Co.	12	50	April 1...		May 6...	May 26...
Ophir.	47	1 00	April 3...	May 4...	May 6...	May 26...
Guide Pub. Co.	15	00	Mar. 31...		May 7...	May 26...
La Grange D. & H.	8	50	Mar. 31...		May 5...	May 26...
Delaware.	5	05	Mar. 24...		May 5...	May 26...
Murchie.	8	15	Mar. 31...		May 9...	May 27...
Savage.	29	50	April 5...	May 6...	May 9...	May 28...
Lady Washington.	4	10	April 4...	May 5...	May 9...	May 29...
Puget Sound Iron.	7	1 00	Mar. 12...		April 25...	May 29...
El Capitan.	2	10	April 2...		May 10...	May 31...
W. Vancouver C.	5	10	April 8...		May 12...	May 31...
Cal. Jute Mill C.	3	1 50	Mar. 3...		May 1...	June 2...
Alaska S. P. & F.	1	10	April 10...		May 17...	June 2...
Andes.	24	25	April 15...	May 16...	May 19...	June 9...
Tilden.	3	05	April 15...		May 19...	June 9...
Mexican.	26	50	April 16...	May 17...	May 20...	June 10...
Salinas Flour Mill.	8	00	April 11...		May 21...	June 10...
S. F. Fuse Mfg.	6	1 00	April 22...	May 22...	May 24...	June 10...
Peerless.	1	25	April 8...		May 17...	June 11...
Best and Belcher.	29	50	April 15...	May 16...	May 21...	June 11...
Rainbow.	10	10	April 15...		May 16...	June 11...
Chol'ar.	13	50	April 21...	May 19...	May 23...	June 12...
Argenda.	7	10	April 16...	May 17...	May 20...	June 16...
San M. & La T. Con.	5	50	April 28...		May 9...	June 16...
Tinite Powder.	9	1 00	April 18...		May 27...	June 23...
Con. Imperial.	20	05	April 30...	May 31...	June 5...	June 26...
Exchequer.	20	20	May 3...	June 3...	June 6...	June 26...
Golden Fleecce Gravel.	32	\$50	May 7...		June 9...	June 26...
Dayton.	12	12	May 2...	June 2...	June 7...	June 26...
Seg Belcher.	22	1 00	May 9...	June 9...	June 11...	July 1...
Indian Spring Dr.	2	03	May 3...		June 5...	July 2...
Sierra Nevada.	79	1 00	May 10...	June 10...	June 12...	July 2...
Hale & Norcross.	82	75	May 10...	June 10...	June 12...	July 2...
Champion (Bod).	12	15	May 7...	June 7...	June 12...	July 7...
Mayflower Gravel.	24	10	May 9...		June 12...	July 7...
McElroy Gravel.	17	10	May 7...		June 10...	July 10...

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**Notice to Contractors.**

SEALED TENDERS addressed to the undersigned, and endorsed "Tender for supplying Coal for the Public Buildings, Ottawa," will be received at this office until Monday, 9th June, at noon.
Specification can be seen and forms of tender obtained, on and after Thursday, 23rd inst., at this office, where all necessary information can be had on application.
No tender will be considered unless accompanied by an accepted bank cheque of \$250 to order of Minister of Public Works.
The Department will not be bound to accept the lowest or any tender.

By order,
F. H. ENNIS,
Secretary.
Department of Public Works,
Ottawa, 20th May, 1884.

NOTICE TO MINERS.

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SEALED TENDERS, addressed to the undersigned, and endorsed "Tender for a Breakwater, Port Arthur," will be received until Monday the 30th day of June next, inclusively, for the construction of a

BREAKWATER
AT
PORT ARTHUR, THUNDER BAY,

according to a plan and specification to be seen on application to John Niblock, Esq., Superintendent, Canadian Pacific Railway, Port Arthur, and at the Department of Public Works, Ottawa, where printed forms of tender can be obtained.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque, made payable to the Honourable the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party decline to enter into a contract when called upon to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

By order,
F. H. ENNIS,
Secretary.
Department of Public Works,
Ottawa, 22nd May, 1884.

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Wanted, fair average
samples of about 1 lb. each,
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CAPITAL \$1,000,000.

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**NOTICE TO CONTRACTORS.**

SEALED TENDERS, addressed to the undersigned, and endorsed "Tender for dredging River Kaministiquia," will be received until Monday the 16th day of June next, inclusively, for dredging across the shoal at the mouth of the River Kaministiquia, Thunder Bay, Lake Superior, according to a specification to be seen on application to John Niblock, Esq., Superintendent, Canadian Pacific Railway, Port Arthur, and at the Department of Public Works, Ottawa, where printed forms of tender can be obtained.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, the blanks properly filled in, and signed with their actual signatures.

The Department will not be bound to accept the lowest or any tender.

By order,
F. H. ENNIS,
Secretary.
Department of Public Works,
Ottawa, 22nd May, 1884.

The Harbert Telephone

(FOR PRIVATE LINES.)



Sold outright. No
renting. Just the
thing for use in Mines
or Mining Districts.
Over 5000 in use. Pat.
Nov. 30, 1880. Late
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EDW. HARBERT & CO.,
159 LA SALLE St. Chicago, Ill., U.S.A.



TENDERS.
COAL.

Are requested for the undermentioned description of coal, to be supplied for the use of Government House, Ottawa,

Tons
Bituminous or soft coal, per ton of 2,000 lbs. 206
Anthracite, hard do. 180

Samples of each coal, and each size of hard coal, with the name of the mine, to be sent in with tender. This coal before acceptance to be screened, either at the Wharf or Railway Station, in the city of Ottawa, through a 1/2 inch screen, at the expense of the contractor.

The screenings and dross will neither be accepted nor purchased, and must be removed, if on any Government property, within the week from date of screening.

The probable quantities will be:

Tons
Hard coal, size 180
Bituminous coal, size 2.6

The contractor, for any or all of the above mentioned kinds or descriptions of coal, to state his price delivered in the coal sheds at Rideau Hall grounds, or such other premises within the city of Ottawa, or Village of New Edinburgh, as may later be pointed out.

The contractor to deliver before 1st August next the whole quantity of both hard and soft coal contracted for. Any delay in the delivery of the same after the above date, will subject the contractor to a penalty of 10 cents per ton for each day's delay, which sum will be deducted from final estimate.

All coal to be free from rubbish or dirt and to be weighed, at the expense of the contractor, in the presence of Mr. Wm. Hutchison, Clerk of Works, Rideau Hall, on such scales as will be named at time of delivery. All coal will also be subject to inspection of Mr. Hutchison, and must be approved of by him before acceptance.

If the quantity and quality is not in accordance with the terms of the contract and quality is not equal to sample, the Governor-General's Secretary shall have power to cancel and annul the same, and reject or grant the contract, or any part thereof, to another party, at the expense of the contractor, and this without previous notice, protest, advertisement or suit at law; nor shall the contractor be thereby entitled to any compensation, indemnity or damage whatever, but will be subject to pay and reimburse the Governor-General's Secretary any extra sum or sums paid out over and above contract agreed on: this to be recovered by usual course of law, if needed.

Separate tenders will be received for hard and soft coal.

All tenders will be considered as Customs duties paid by contractors as no "free entry" will be entertained.

The name of the party or parties tendering with their address in full, must be attached to the tender.

Each tender for coal to be accompanied by an accepted bank cheque of \$250, payable to the order of the Governor-General's Secretary, which cheque will be forfeited if party or parties tendering fail to sign contract in one week after being notified of acceptance of tender.

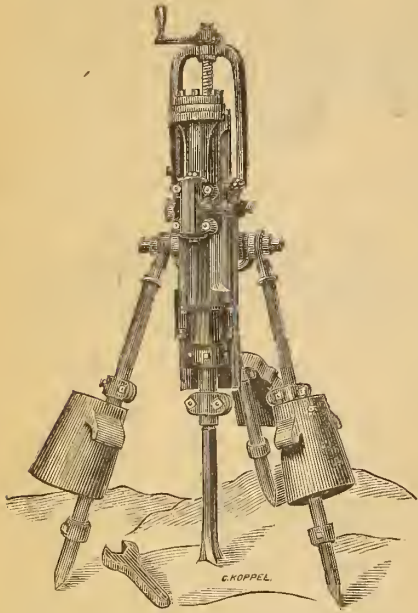
(Signed)
MELGUND,
Governor-General's Secretary.
Ottawa, 25th May, 1884.

"The undersigned hereby agrees to furnish and deliver the following coal strictly in accordance with the terms of the annexed specification, and for the price per ton set opposite each kind, viz:—

	Rate per ton	Total amount
Anthracite (name of mine)	\$	\$
Tons of 2,000 lbs. of "Furnace"		
Tons of 2,000 lbs. of "stove"		
Bituminous (name of mine)		
Tons of 2,000 lbs. of		

Name and residence of party tendering

MILLER BROS. & MITCHELL



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MINING AND CONTRACTORS' PLANT,
LATEST IMPROVED STEAM ROCK DRILLS,
HOISTING ENGINES,
AIR COMPRESSORS,
ELECTRIC BLASTING APPARATUS,
IMPROVED PATENT STEEL WIRE ROPE,
&c., &c., &c.

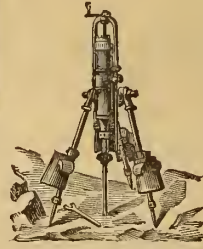
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Farmers, Miners and Prospectors, having unbroken
Phosphate Crystals for Sale, can find a cash
purchaser by applying at the Office of

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Union Chambers, 14 Metcalfe Street, Ottawa.

Parties offering crystals for sale will please mention the
colour, length and diameter—large ones preferred.

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A Competent Expert is permanently engaged for the purpose of making Unprejudiced Reports on all Mines placed
in our hands for Sale, such reports being at all times open to intending purchasers for examination.

Phosphate, Iron, Iron Pyrites, Copper, Asbestos, Mica, Plumbago,
Gold and Silver Mines, and Marble and Sand-
stone Quarries, For Sale.

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OF EVERY DESCRIPTION MADE BY A COMPETENT ASSAYIST.

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Address all Communications to

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IN THE
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Section.	Town- ship.	Range— West.	Acres.	
	3	14	23	640
	17	14	23	640
	15	14	23	640
	19	14	23	640
W $\frac{1}{2}$ and N. E $\frac{1}{4}$	35	14	23	480
N $\frac{1}{2}$ and S. E $\frac{1}{4}$	19	15	23	480
S $\frac{1}{2}$ and N. E $\frac{1}{4}$	15	16	23	480
E $\frac{1}{2}$ of N. W $\frac{1}{4}$	15	16	23	80
S $\frac{1}{2}$	3	17	23	320
N $\frac{1}{2}$	9	15	23	320
S. W $\frac{1}{4}$	31	18	26	160

4,880

Title direct from the Crown.

For price and field notes apply at
the office of the MINING REVIEW.

PHOSPHATE PROPERTY

In the Township of Portland West,

FOR SALE.

Lots 25, 26, 27 and 28, in the
3rd range. Some excellent surface
shows have been uncovered on these
lots and only require capital for de-
veloping. Price and particulars
given at the office of the MINING
REVIEW.

PLUMBAGO LOT FOR SALE

IN THE TOWNSHIP OF BUCKINGHAM,

On which are extensive surface shows and
out-croppings of fine quality of Graphite.
Price \$1,000. Further particulars to be
had at the office of the MINING REVIEW.

TIMBER LIMIT

ON LAKE WINNIPEG

FOR SALE.

50 Square Miles.

This limit will be very valuable.
Apply at the office of the MINING
REVIEW for price and particulars.

FOR SALE,**White Marble Quarry on Calumet
Island.**

At this quarry there is an inex-
haustible supply of most beautiful
white marble. Price \$800. Sam-
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tained at the office of the MINING
REVIEW.

PHOSPHATE PROPERTIES
FOR SALE

IN THE TOWNSHIP OF WAKEFIELD.

Mining Rights on S $\frac{1}{2}$ of Lot No. 16, in
the 1st Range.
" " on Lot No. 23, in the
2nd Range.
" " No. 26, in the
4th Range.
" " No. 20, in the
5th Range.

The fee simple of Lots Nos. 22
and 23, in the 4th range, (400
acres). All these lots have been
carefully explored by experts and
very favourably reported on; they
are virgin properties and in the
heart of the Phosphate Belt. For
further particulars and price apply
at the office of the MINING REVIEW.

CANADIAN MINING REVIEW

VOL. 2.—No. 6.

1884—OTTAWA, JUNE—1884

VOL. 2.—No. 6

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OFFICE:
UNION CHAMBERS, 14 Metcalfe Street.

The CANADIAN MINING REVIEW is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts as well as others interested in Canadian Mineral Lands are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 5th of the month it is to appear.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

International Geological Congress at Berlin.

The following is the substance of a circular which has been forwarded by the Committee of Organization for the above Congress to the scientists throughout the world, dated at Berlin, May 15th:

"The International Geological Congress decided at its meeting on October 2nd, 1881, at Bologne, that the third session should be held at Berlin in 1884."

"The Committee of Organization, formed in Germany, has appointed the 25th of September for the opening of the session. The meetings will occupy from the 25th till the 30th of September, and geological excursions will take place between the 1st and 5th of October."

"An exhibition of geological collections and charts will be held during the session."

"The programme in detail of the meetings and excursions will be distributed in good time before the opening of the Congress."

The circular contains a request that those who desire to take part in the transactions of the Congress will, as soon as possible, forward their application for membership to the Secretary of the Committee of Organization at Berlin, giving name in full, vocation and address.



THE LATE HENRY G. VENNOR.

On the morning of the 9th of June it became the painful duty of the Press of this continent to announce the death of Henry G. Vennor, Esq., scientist and weather prophet, whose name had been made famous during the past few years of his life, and had become known throughout the entire civilized world. The fact that Mr. Vennor had been ill for some time had been generally known, and it had become apparent that there was little hope of his recovery. He passed away on Sunday evening, the 8th inst., and his death will have been a sad surprise to many. Mr. Vennor was born in Montreal, on December 30th, 1840, of English parentage, his father being a member of the firm of Budden & Vennor, an

old established hardware house. He was educated at Philip's School and the High School there. During his boyhood that preference for natural science which led to his celebrity of late years manifested itself, and while yet at school he collected and exhibited specimens which gained honourable mention at a provincial exhibition, and which is now in McGill College University. After a course in the zoological and geological classes of McGill, and a session of the classes in provincial land surveying and civil engineering, Mr. Vennor tried, in the year 1860, mercantile life in the wholesale warehouse of Frothingham & Workman. After five years, however, he gave up that and received an appointment as assistant to the late Sir W. E. Logan, taking part in all the surveys of the geological commission for fifteen years after his appointment, serving directly under Sir W. E. Logan, Dr. T. Sterry Hunt and Dr. A. R. C. Selwyn. In 1870 he was elected a fellow of the Geological Society of England. Mr. Vennor's revised classification of the old Laurentian Rocks of Canada, which were his especial field of survey, gained him a reputation as a scientific observer, and in 1872 his ability gained further recognition by his researches into the phosphate resources of Ottawa County. In 1880 Mr. Vennor resigned his position on the survey, having during his connection with it rendered the country and science at large valuable service. But useful as these services were, and stamping him as they did, as a man of marked ability in his profession, it is rather to his prognostica-

tions regarding the weather that Mr. Vennor owed his fame which dated from the correctness of a prophecy that the Christmas of 1875 would be a green one, followed by a muddy New Year's Day. Following up his success and adding to his celebrity, he published the first of *Vennor's Almanac*, since then published yearly, which among other kindred matter, contained, as is of course well known, monthly forecasts of the weather for the entire year, and which he supplemented with the *Monthly Weather Bulletin*. Mr. Vennor was also widely known as a student of ornithology; his work on "Our Birds of Prey," published in 1875, is a valuable one, and his collection of *raptores* (birds of prey) is one of the most complete on the American continent. Born, as above stated, in 1840, Mr. Vennor had reached but the age of 43 years and 6 months at the time of his death. The sad result removes from our midst a thoughtful student of science, whose work will live after him.

In the May number of the REVIEW attention was called to the dissatisfaction which some of the clauses in the Dominion Mining Regulations had created among miners and others interested in mining industries in the North-West Territories. We took occasion at the same time to point out the advisability of the representative mining men in the North-West meeting together and formulating their objections to the clauses in the regulations, forwarding the same to the Minister of the Interior for his consideration, and pointing out to him wherein they are distasteful, and the nature of

the alterations that would make the regulations generally acceptable to the miner and at the same time be reasonable in the interest of the Government. Since the publication of the article referred to, Mr. Burgess, Deputy Minister of the Interior, on the 3rd instant, left Ottawa for Winnipeg, and being most anxious that all dissatisfaction among the miners of the North-West should be speedily dispelled, he proceeded on the 16th inst. to Calgary, where he is now in conference with the leading practical mining men, with whom he will engage in an exhaustive discussion of the various points at issue, and there exists no doubt that Mr. Burgess, who is invariably disposed to act impartially, will agree to any feasible and advisable alterations in the regulations that will have a tendency to encourage the prospectors and miners and to advance the mining industries of the North-West, which promise to become of so great importance in the country.

In the Rocky Mountain district mining matters are rather quiet, pending the return of the army of prospectors who are at present exploring the Purcell and Selkirk ranges. The latter range is considered to be the richer in mineral, probably because it has been more explored, and years ago a considerable amount of mining was carried on there, but, on account of the great distance from other mining centres, it was abandoned, as less than "ounce diggings" did not pay. The western slope of the Rockies is the objective point for the majority of prospectors who have flocked from British Columbia and from the East in hundreds since the opening of spring; nevertheless a fair force of miners and prospectors will operate on the eastern side in the foot hills.

In the September, 1883, number of the REVIEW we published the opinion of Mr. J. S. Phillips, Mining Engineer and Metallurgist, of New York, respecting the mineral wealth of

our north western country. Among other important remarks made by Mr. Phillips he gave expression to the following:

"The trans-continental railway of Canada will enter into and cut its way across—or in a mining manner, costean—the whole mountainous portions of the country, and will soon enter the wide and most interesting mineral zones of the Rocky and Wasatch mountains, where intelligent observations and explorations will, in my opinion, cause Old England to be once more proud of Colonial wealth.

"This field for mining, with mountains running over 1,000 miles northerly, the whole breadth of the Canadas, will probably extend across the longitudes of Western Dakota, Montana and Idaho, of the United States of America, but for lode or vein mining will not reach so far west as Cariboo in British Columbia, as the Sierra Nevada chain of mountains is thereabout broken and detached for a few hundred latitudinal miles. This does not prevent the possibility of auriferous discoveries in gravel formations, which are very likely to be found in many valleys that have received the water washed debris from the western declivity of the previously named mountains along the route. I have been frequently questioned by letters from England: Where is the best place to explore for minerals? and I answered both Englishmen and Canadians—Prospect the breadth of the Canadas on either side of the advancing railway, but more particularly opposite to Western Dakota, Montana and Idaho, for vein mining, and thence westward for gravel and placer gold, where vast mineral areas lie unexplored.

"When this railway is sufficiently far advanced, the north and south branches of the Saskatchewan River, the Athabaska, and Peace Rivers, and the Rivers Liard, Peel, and McKenzie, will be found also convenient for both prospection and power for mining this 1,000 miles long of the east slope of the Rocky Mountains, whilst the five branches for mining the head waters of the great Yukon River may be utilized for the north-western slope with its spurs and parallel range. A few brave and strong men may make immense fortunes along this range of mineral-bearing strata. I know of no other unexplored belt in North America that ex-

poses superior inducements, and there is probably nothing on this continent but the unexplored eastern slope of the mighty Andes, which extends 4,000 miles from north to south through the several rich countries of Columbia, Ecuador, Peru, Bolivia, the Argentine Republic, and Patagonia; but Canada has the great advantages of your own language, laws, and flag; whilst these are mostly inaccessible, and more particularly so to foreigners."

CANADA'S PHOSPHATE TRADE.

The reports that have reached us from the mines during the month are of a most satisfactory nature, and the managers of the different properties predict a very large output for the year. Besides the more extensive mines in operation many smaller ones have been opened since the snow left the mountains and new ground is being broken daily throughout Ottawa County, revealing the fact that the Townships of Buckingham, East and West Portland, Derry and Bowman are likely, for the future, to be the chief phosphate producing localities. Some of the mines in Templeton and Wakefield, whose reputations have already been established, will, in all probability, continue productive for years to come; notably, those owned by Messrs. McLaurin & Blackburn, J. A. Gemmill and M. Haldane & Sons. The industry has been placed on a more permanent basis than formerly, and proper attention is now being directed to practical mining and to shipping the output of the mines in as pure a state as possible, by separating the mineral from foreign matrix so far as it can be done by hand manipulation. Some of the large producers contemplate the erection of suitable machinery that will supersede hand cobbing and bring the output of their mines up to a high state of purity at a much reduced cost.

It was expected by some that the reduced value of raw phosphate rock that ruled in the English market at the beginning of the year would have had a tendency to discourage the miners, but such has not been the case, and the mines have been as actively worked during the past six months as at any time since this industry was started in the country. Those who availed themselves of the low rates of freight from Montreal at the opening of navigation were en-

abled thus to realize almost as good a price for their shipments as was obtained last year. Assuming that the present price of phosphate in England and on the continent of Europe should not vary, and that freights should continue to rule at the average for the past five years, it would be difficult to point out any industry or mining venture that will return a handsomer profit than phosphate mining when directed by good management and economy. According to the present English quotations for Canadian apatite, 80 per cent. mineral is worth, say at Buckingham Station, eighteen dollars per ton, and the average cost of mining and delivery at this point, from all the mines in the Rivière du Lièvre district of the County of Ottawa does not exceed ten dollars per ton; thus returning to the miner the very handsome profit of \$8 per ton, equivalent to 80 per cent. on his outlay. The experience of the past few years has proved these figures to be practically correct, and the owners of mines are thus enabled at the close of each day's work to estimate to a nicety the result of their operations.

THE MINES.

High Rock Mine.—Since the arrival of Mr. Pickford, President of the Company that owns this valuable property, from England, last month, important changes have been made at the mine, and an entirely new management organized; steam-drills, hoists, etc., have been introduced, and it is thought that a larger quantity of phosphate will henceforth be raised, and at a reduced cost. Some extensive deposits have been discovered on the property during Mr. Pickford's visit and are being opened up. Under the new organization Mr. P. H. Smith controls the Mining Department, and Mr. S. Hicks has the general superintendence of transportation from the mine to Buckingham Railway Station, from which point the output of the mine is consigned to Messrs. Wilson and Green, of Montreal, the appointed general managers and agents.

Star Hill Mine.—Mr. W. H. Williams, of New York, President of the Union Phosphate Company, recently returned from the company's property and reported everything going ahead to his entire satisfaction. This company began work about a year ago, and up to the present time the operations have been confined to a very limited space, within an area of about two acres, from which upwards of 3,500 tons of excellent phosphate have been raised and the deposits are becoming more productive. The Union Company owns 1,300 acres of

valuable phosphate land, and has thoroughly equipped its property. We are informed that the President, during his recent visit, signed a contract for the construction of a tramway from the mine to the River du Lievre which will greatly facilitate the transportation of ore.

The *North Star Mine*, belonging to the Dominion Phosphate Company, continues very productive and the quality of the phosphate is of a higher grade than that of any other mine in the district; when separated from the gangue rock the mineral is found to be quite free from refractory matter, and little dressing is required. This mine will be a steady producer for many years to come.

The *Little Rapids Mine*, owned by W. A. Allan, Esq., of Ottawa, is turning out a quantity of excellent phosphate that will compare favourably with that from the *North Star* mine. At the bottom of one of the shafts, down about 135 feet, a body of solid phosphate stretches from side to side and from the surface down, for the full distance, broad views of mineral are visible on each side of the shaft. At two different levels stoping has been begun in the veins and the phosphate that is being produced is of a pale bluish-green colour, apparently free from objectionable foreign matter.

The *Emerald Mine* gives employment to a large number of miners and other workmen, and the output of the mine depends entirely upon the force employed. The mineral is there in sight in thousands of tons and powder and fuse is all that is required to convert it into a merchantable commodity. Several of the stock holders and directors of the Ottawa Phosphate Company visited the mine during the present month, and those who had not seen the property before were much surprised at the sight that met their eyes and congratulated each other upon the prospective handsome profits from their investment.

The *Lansdowne Mine*, adjoining the *Emerald*, the property of the Dominion Phosphate Company, is developing well, but as the miners have been, up to the present time, engaged in stripping, there is nothing more to report than was published in the May number of the REVIEW. This property is certainly a very valuable one and will improve with development.

The mines above named give employment to about 375 men, all told, and the output aggregates, as nearly as can be estimated, 100 tons daily. The output from the *High Rock*, the *Star Hill* and the *Emerald* mines is being forwarded in scows to Buckingham landing and thence in waggons to the Railway Station.

Four hundred and fifty car loads of Phosphate were shipped over the Canadian Pacific Railway from Buckingham to Montreal during May, aggregating 7,000 tons.

PHOSPHATE QUOTATIONS.

The most recent London quotation for Canadian apatite is 1s. 1½d. for 75% mineral, with one-fifth of a penny rise, with advices that the market is stiffening. A London, England, correspondent writes: "As regards Canadian Phosphate of Lime, one shilling per unit for 75% is the lowest price we have seen. Charleston, S.C., people are combining to raise their prices, in which we think they will succeed to some extent, as it has been mainly their pushing to sell on a rather weak market that brought prices down all along the line." Better prices will doubtless be obtained later in the season.

Facilitating Transportation of Phosphate.

Improvements on the du Lievre.

Short Line Railway from Buckingham Village to connect with the C. P. R.

Engineers, employed by the Department of Public Works, have completed the necessary survey for a lock at the Little Rapids on the Riviere du Lievre, and when the detail plans have been prepared tenders will be invited for the construction of the work. The drawings are now being made, and, in all probability, the contract will be given out in time for the contractor to proceed with the work when the water in the river has sufficiently receded to enable him to put in the foundations for the masonry. The lock will be built of stone and should be completed by the opening of navigation on the river next year. This will be a great convenience to the phosphate miners as it will afford sufficient water for large vessels to ply between the High Falls and Buckingham landing, the northern terminus of the proposed

SHORT LINE RAILWAY

to connect with the Canadian Pacific Railway at Buckingham station. That this connecting link will be constructed is now an assured fact. Mr. W. H. Williams, President of the Union Phosphate Company, has stated that he is co-operating with a few other capitalists who purpose building these four miles of railway as a private enterprise, and that work will be begun by them within a month or so. The officials of the Canadian Pacific Railway Company inform us that Mr. Van Horn, the General Manager, has carefully considered the feasibility and advisability of constructing this branch and that he has decided to begin work on it almost immediately in order that the line be in running order for the accommodation of phosphate shippers during the autumn, when the bad condition of the waggon road

between Buckingham Village and the railway station renders the transportation of ore so difficult. There now exists little or no doubt that this work will be proceeded with during the summer either by Mr. Williams and his associates or by the C. P. R. Co., and of the two it would be more desirable that the line become the property of the latter corporation than that of private individuals. The present road over which the output of the mines has heretofore been hauled has been a serious obstacle to the phosphate producers in the du Lievre district, and the progress of construction of a railway will be eagerly watched by them.

MICA IN CANADA.

Systematic searching during the past year has resulted in the discovery of many important deposits of this valuable mineral and the quality of some of the specimens received at this office is equal to any that has been mined in the United States or in any other part of the world in point of clearness and its resistance of heat. As to the size of crystals many of the surface specimens will yield perfect plates measuring as large as 5x9. It is a true *muscovite* and was not known to exist in Canada in economic size or quantity until within the past year.

One of the most important discoveries yet made is in the Township of Villeneuve, Ottawa County, within two and a half miles of the Riviere du Lievre, and the quantity of merchantable mica visible on the surface, imbedded in a gangue of quartz and feldspar, is sufficient to make the property one of great value. A party of miners have begun to open up one of the veins, and we are informed it is developing most satisfactorily.

In the Township of Palmerston, County of Frontenac, some extensive deposits of very fine mica have been found, and we have received some beautiful specimens of *muscovite* from the Nipissing district, with a report descriptive of the deposits, and showing that it exists there also in paying quantity and in merchantable size.

At Sydenham, Province of Ontario, a fair quantity of mica, of an amber or wine colour, is being mined and Mr. Allan's mine in Burgess, County of Lanark, has produced a large quantity of excellent mica. From the mines at present in operation, and from those that are now being opened the Canadian market can be supplied and dealers will not, henceforth, be compelled to import their stock from the United States.

Applications will be received by the Michipicoten Copper Company, Michipicoten Island, Lake Superior, from miners and mine labourers for contract work.

Lake Superior Silver Mines

SATISFACTORY WORK AND RICH ORE AT THE RABBIT MOUNTAIN.

THE TWIN CITIES MINE.

THE HURONIAN WORKING IN 8 FEET OF PAY ORE IN BOTH DRIFTS.

WORK AT LAMBERT ISLAND.

The Zinc Mines to be Opened up.

During the past few months much attention has been directed towards this rich mineral district which has been visited by a number of practical mining men and experts who have been unanimous in predicting a brilliant future for the industries already established. The *Lake Superior Mining Journal* of a recent date publishes an article under the above headings and remarks that the Rabbit Mountain and Huronian districts are attracting most of the visitors on account of there being about \$100,000 worth of silver ore now lying in the bins and on the dumps of the two mines.

Several of the owners of the *Rabbit Mountain Mine* were on their property during the present month and have expressed themselves well pleased with their venture. A new shaft has been started and from it wonderfully rich ore is being taken.

The *Twin Cities Mine* is progressing with the greatest satisfaction to the owners. Their vein is well defined and they are taking out very rich high grade silver ore and native silver, associated with zinc blende, which also assays very high in silver. The assays of this have gone from \$400 to \$2,600 per ton.

Arrangements have been concluded for the working of other mines in the Rabbit Mountain region in which silver has been found. This section of country has evidently been the centre of several violent disturbances of the earth's crust, as unlike other parts of the country where the veins run parallel, the fissures are here found to run in every direction, with the formation, diagonally and directly across it, and running with and cutting the numerous trap dykes which intersect that part of the country. These dykes have had a great influence on the mineral bearing features of the district.

A party of miners in charge of Capt. Wm. Wheeler have started for Lambert Island in Thunder Bay to commence work there.

Arrangements have also been made which will result in the immediate working of the zinc mines on the north shore. The zinc blende, the black jack of the miners, taken from a wonderfully large deposit yielded

to the Assayer for the Dominion Geological Survey 54 per cent. of metallic zinc.

The famous Huronian is a steady, reliable producer of both gold and silver ore. The mill is doing splendid work. The shaft is down

over 70 feet and there are over 100 feet of drifts. The miners are working in 8 feet of pay ore in both drifts and the sylvanite seems more plentiful and the vein looks even better than the splendid showing it made at surface.

Gold Mining in Beauce.

Although mining has been going on in this section of Canada, more or less, during the past thirty years, few people have any idea of the richness of many of the gold bearing localities in that portion of the Province of Quebec known as the County of Beauce. Owing to the great uncertainty heretofore existing as to the validity of the mining rights held by miners in the territory of Rigaud-Vandreuil, mining operations have been very seriously retarded. A recent judgment of the court, however, in the *DeLery patent case*, a test case, has removed this uncertainty and Col. Duchesnay, Government Inspector for the Chaudière Mining Division, in his official report for 1883, has expressed it as his opinion that the mining industry will now assume a flourishing condition and even attain great importance in the district. Col. Duchesnay also remarks that the conviction appears to be more firmly held than ever that the gold and silver mines of Beauce are as valuable as those of any other country. The thousands of dollars which have been already collected from alluvial workings, of the most primitive and insufficient description, are a proof of this; and the numerous quartz veins discovered in these alluvial workings, and at many other places, prove, through the frequent assays that have been made, that rich results may be expected from operations in this branch of mining. The preliminary expenses of this latter industry are very great, and, therefore, the proprietors of the soil did not dare to incur them before knowing that they could continue the work, a question which has been settled by the *DeLery* judgment referred to.

Some important work is at present being done at various points in the district by chartered companies and by individuals. The

CANADA GOLD COMPANY (LIMITED),

up to the close of 1883, had not resumed its ordinary operations since the destruction of its shafts in the fall of '82; it has only employed a few men to wash over the tailings of previous years; but this work, which is generally profitable, could not be so for this company, as it uses pulverizing machines before the first washing. The quantity of gold obtained was, however, more than sufficient to cover expenses. At the close of last year it was the intention of this company to have resumed work this season with a force of several hundred men, but to what extent operations have been resumed we have not yet learned.

NORTH EAST RAPID COMPANY.

In October last this company re-opened some old workings that had been abandoned for nearly twenty years, and though they had been, up to the close of 1883, only making repairs and explorations, they had the good fortune to meet with some nuggets of considerable size, and the best possible indications of gold bearing quartz as well as alluvium.

THOMAS RICHARDS & CO.

are working in St. Charles concession, River Gilbert, and give employment to an average force of forty men. In the spring of 1883 they constructed a long aqueduct which crosses the valley of the Gilbert on trestles and furnished the necessary supply of water for washing, after driving an immense water wheel which assisted a steam pump in draining the underground workings. A nugget, weighing nearly twenty-two ounces was recently found on this claim, which is one of the richest in the district, and its yield, especially during the last few months of the past year has been quite a fortune. A number of rich quartz veins have been crossed by the galleries, and it is proposed to work them during the present year.

MESSRS. ALLAN & HUMPHREY

During last autumn these gentlemen reached the bottom of a second shaft at a depth of one hundred and seventeen feet, and found enough gold to show that they had fallen upon an alluvial deposit. As this shaft appeared, however, to be on the very edge of the deposit, they found it necessary to sink another more towards the centre. In this shaft (No. 3) they have struck the gravel at a depth of about one hundred and forty feet, and about three feet above bed rock. For some distance above the gravel they penetrated a heavy layer of fine sand which, when washed for test, was found to carry gold in paying quantity, a certain indication that the gravel will prove to be very rich.

The only work hitherto done at the Ruisseau d'Ardoise has been of a superficial character. This stream flows near the workings of Messrs. Allan & Humphrey, and the discovery lately made by these gentlemen has opened

to the mining industry an immense field, extending over the whole valley of the Famine. "Gold has been found at several places on the Famine" is stated in the Canada Geological Report for 1866. Since that date there has been but little done in the way of exploration, but the precious metal has always been found, especially on the river Veilleux, one of its tributaries, though scattered through the gravel, and not in compact deposits as on the Gilbert. The result of the recent workings of Messrs. A & H., leads to the supposition that the searches heretofore made on the Famine had been confined to the unproductive side of the valley, and that by following the natural lay of the land from their claim upwards, along the left bank of the river, there would have been a greater probability of success.

GOLD MINING ASSOCIATION OF CANADA.

This wealthy English Company, which owns a large extent of gold bearing lands on the River du Loup, was enabled to wash uninterruptedly during last summer by means of its hydraulic power. The richness of the du Loup has long been established by the product of the mining operations which have been going on since 1850, but the bed of auriferous gravel being nearly all above the level of the present flow of water, the hydraulic power cannot be made to work upon it with all the advantage that was expected.

The total product of gold in the Chaudière mining division during last year was larger than usual in proportion to the amount of work performed.

From the 1st of April, 1879, to the 30th of September, 1883, there had been collected on the left bank of the Gilbert alone, in the space of a mile long by one hundred feet wide, 7902 oz., 2 dwts., 4 grs. of gold, worth, @ \$17.75 an ounce, \$140,262.30, according to the sworn monthly reports furnished by the miners. In view of the small number of men employed, and the loss of at least thirty per cent. by a defective system of washing, this is an excellent result, yielding a reasonable profit to those engaged in the work after paying all expenses.

It is generally admitted, however, that alluvial gold mining, especially on the Gilbert, will soon be superseded by quartz mining, of which so many rich veins have been found. This will give employment to a much larger number of men, and will be the means of introducing greater activity into a district which has not, heretofore, received the attention from miners that it has deserved.

The Central Ontario Iron Mines.

On the morning of the 4th instant a special train left Trenton for a run over the line of the Central Ontario Railway, having the following gentlemen on board: Senator Payne, of Cleveland, Ohio, a director of the Central Ontario Railway and the Coe Hill Mining Companies; Mr. James McLaren, of Ottawa, who is largely interested in both companies; Mr. S. J. Ritchie, of Akron, Ohio, President of the Railway, and also largely interested in the Coe Hill and other iron mines contiguous to it; Mr. Wm. Chisholm, of Cleveland, Ohio, President of the Coe Hill Mining Company; Mr. Samuel Mitchell, of Marquette, Mich., an iron operator in the Lake Superior district, and interested in the Coe Hill Mine; Mr. F. A. Bates, a mining expert of Cleveland, Ohio, who has assumed the management of the Baker Mine, a portion of the C. O. Railway Company's property; Mr. Preston of Pittsburg, Ohio, another mining expert representing Pittsburg capitalists; Messrs. Arthur Coe and Geo. W. McMullen, Directors of the C. H. Mining Co., and Mr. James B. McMullen with others interested in the railway and the mines.

After leaving the G. T. R. Junction at Trenton the train proceeded to Weller's Bay, the shipping port for the railway on Lake Ontario. Here the company owns a water front of over 150 acres, bordering the entire deep water on the north-eastern shore of the bay, thus giving it access to one of the most desirable harbours on the lake, covering upwards of four square miles of deep water.

The party first visited the new dock, a portion of which will soon be in readiness for the reception and discharge of freight, and when completed will be 2,000 feet in length by 28 feet wide, covered with a massive superstructure, the crest of which will be 36 feet above the water. This superstructure will consist of a deck with double tracks and openings between the rails, communicating with 150 ore pockets, from which the ore can be dropped directly into the holds of vessels lying at the dock. After a careful inspection of this terminus of the railway and a visit to the roundhouses, at Weller's Bay and at Trenton, and the locomotive repairing and car shops, the party reached Picton towards evening, and on the following morning the journey was commenced over the newly constructed portion of the road. The line of the railway follows the valley of the River Trent as far as Chisholm's Rapids. From this point it takes a northward direction and traverses the townships of Sidney, Rawdon, Marmora, Madoc, El-dorado, Tudor, Limerick, and, entering Wallaston, the road terminates for the present, at the

COE HILL MINE.

Arriving at this point the excursionists were greatly astonished at the sight it presented. On the hill over-looking the ore platform were no less than 50,000 tons of carefully selected rich magnetic iron ore, neatly piled, and beyond this the workings on the vein. These extended some 2,000 feet in a broad irregular gash along the course of the vein, which appears to have an average of about 40 feet in thickness from wall to wall. The stopes are not steep, and one can only account for the enormous stock pile that has been taken from them by the fact that almost every pound that has been taken from them is good marketable ore. Three shafts have been sunk to a depth of 55, 58 and 68 feet respectively, and these indicate that the vein is becoming thicker as lower levels are reached. Several prospect holes have been sunk by the diamond drill, the deepest of which has cut the iron at a depth of 280 feet from the surface. At this depth the vein still carries its full thickness, and it is fair to assume that this enormous deposit will prove persistent to as great a depth as that to which it can be worked at a profit. But even assuming that the vein were cut off short at the depth to which it has been tested, and that the strong indications shown east and west of it, which have not been tested, should prove valueless (two well nigh impossible contingencies) there would still remain practically in sight not less than 2,000,000 tons of good ore.

The expense of putting this ore on the market may be estimated as follows, care being taken to put the cost of every item at the highest figure:

	per ton.
Mining and delivering on cars.....	\$1 00
Freight to Weller's Bay and delivery on vessels.....	1 00
Freight to Cleveland and Lake Erie ports.....	75
Duty.....	75
Insurance and commission.....	15

Total cost per ton delivered in U.S. market.... \$3 65

The lowest rate for this grade of ore during the past ten years at Cleveland has been \$6 and the highest \$12 per ton. Thus, judging by the past 10 years, \$2.35 per ton profit on this enormous quantity of ore in sight is about the most unfavourable estimate that could be made, while \$6 per ton is quite within the range of possibility, and an average of \$3 per ton may safely be counted on.

The following analysis of the Coe Hill ore was made by the chemist of the Cleveland Rolling Mills:

Phosphorus.....	0.023
Silica.....	3.70
Sulphur.....	0.91
Metallic Iron.....	66.40

It will thus be seen that the success of this mining venture is well nigh established, and that, in the face of a specific duty of 75c. per ton, these railway and mining companies (the proprietorships of which are for the most part identical) have expended over \$2,000,000 with a view to recouping themselves by the sale of Canadian iron ore in the American market.

The party next visited the

BAKER MINE

where very little work has been done beyond mere prospecting. That this deposit is an extensive one there exists no doubt. The needle attractions indicate the presence of a body of ore varying from 40 to 70 feet in thickness, extending without a break, for fully a mile. A strong outcrop of excellent ore is traceable for the whole distance, and each of the numerous test pits which have been sunk along the vein has uncovered a large body of it.

The following is an average of the analysis made of the samples of the ore taken from different portions of this vein:

Silica.....	5.50
Phosphorus.....	0.08
Sulphur.....	1.00
Metallic iron.....	66.28

It has been feared that the amount of sulphur might possibly interfere with the value of this ore for shipment in its raw state, but from statistics obtainable regarding the treatment of poorer ores (carrying a similar percentage of sulphur) in Pennsylvania it is evident that in a country like this, where supplies of firewood and charcoal are practically unlimited, this will not prove a serious obstacle. In fact it is probable that the cost of desulphurization would be more than balanced by the reduction in the cost of carriage of the ore thus treated as compared with raw ores.

At the Cornwall Mines, in Birks County, Pa., the cost of roasting, in the leading furnaces, magnetic hematite ore carrying in iron from 40 to 46 per cent., and from 3 to 5 per cent. of sulphur, varies from 18c. to 30c. per ton.

In the case of the Baker ore (should it need roasting) charcoal would be used which, under existing circumstances, would render the desulphurizing process less expensive.

Mr. F. A. Bates has just assumed the management of this mine, and in a short time it will no doubt be sending out large quantities of ore. He also contemplates the erection of charcoal reduction works in this region, and when these are in running order much of the ore, which is now useless, as being of too low a grade for shipment and for the payment of specific duty, can be worked at the pit's mouth at a fair profit.

THE EMILY MINE,

which is only a few miles from the Baker, is quite as promising as either of those already described, and besides these there are many others in the townships of Tudor, Limerick, Wollaston, and Chandos that only await development to prove their value. In fact the iron industry of North Hastings has now obtained such a footing that its speedy development into a lasting source of revenue to the Province may be counted on. Much of the credit due to the accomplishment of this very desirable consummation must attach to Mr. Wm. Coe, of Madoc, who in spite of all sorts of discouragements has stuck steadfastly for the past fifteen years to his purpose of developing the iron interest of North Hastings.

After devoting two days to this pleasant and interesting excursion the entire party returned to Trenton in high glee over the prospects for their enterprises.

The Geology and Economic Minerals of Hudson's Bay and Northern Canada.

In reporting the valuable memoir on the above subject, read by Professor Bell, Assistant Director of the Geological Survey, at the meeting of the Royal Society lately held in Ottawa, we propose to give principally our notes on the portion of the paper which referred to the economic minerals. We understand that the article will be published at length in the Transactions of the Society. Dr. Bell has devoted so much time and attention to investigating the geology and minerals of Hudson's Bay and our northern regions generally, that whatever he says on these subjects is of interest. He illustrated his remarks by a large geological map of Northern Canada, which he said extended into the polar regions of North America, or to the most northern points explored. A description was given of the character and distribution of each of the groups of rocks as far as they are yet known in these territories. They embraced the following, in ascending order: The Laurentian, Huronian, a pre-Cambrian formation, the Animikie and Nipigon series, the Silurian, Devonian, Carboniferous, Liassic, Cretaceous, Tertiary and post-Tertiary. In regard to the Laurentian, Dr. Bell said that the great area which it occupied in Northern Canada and Greenland, had a somewhat circular outline, with patches of newer rocks in the centre or around Hudson's Bay. The Huronian was the great metal-bearing formation of Canada. It was intimately associated with the Laurentian and was mostly found within the same general limits. Speaking of the Devonian, he said that although it extended through an immense distance in the North-West Territories, it did not appear to occupy so great an area as had been supposed, as much of the rock which had been taken for Devonian had been found by Dr. Bell to be really Cretaceous. Referring to the post-Tertiary period, he thought that in some part of our northern territories we might find stores of fossil ivory like those of Siberia, as he had obtained the remains of both the mammoth and the mastodon around Hudson's Bay; and the tusks of elephants were not uncommon in the banks of the Rat River in the far North-West.

A great variety of rocks and minerals of economic value had been already noted in the regions referred to. Among those of a non-metallic nature were limestone, dolomite, granite, slate, flag-stone, marls, clays, ochres, cement stone, gypsum, stone and sand for making glass and porcelain, soapstone, mica, plumbago, asbestos, phosphate of lime, common salt, etc., etc. Fine dolomites and quartzites and limestones were abundant on the Eastmain coast of Hudson's Bay, and limestone was found on the islands in its northern parts. Gypsum formed the banks of the Moose River about forty miles up and was said to occur between Moose Factory and Albany. It was also met with near the Slave River. A pure quartzite, like fine white marble, occurred on Marble Island and to the west of Hudson's Bay. Soapstone was found near Mosquito Bay and used by the Eskimo for making their lamps, kettles, etc. Mica was reported as abundant in Chesterfield Inlet and Hudson's Strait. Specimens of pure plumbago had been brought on board ships passing through the Strait by the Eskimo. Lumps of it had also been picked up on Athabasca Lake. Phosphate of lime had been found near the Coppermine River, and Dr. Bell had also discovered it to the north of Lake Superior. Pure salt, ready for use, was found in great quantities on the surface at one place on the Slave River, and salt springs were common on the Athabasca and the Mackenzie. Dr. Bell had found some rare minerals and a number of ornamental stones around Hudson's Bay. Among the former were lazulite, axinite, etc. The lignites of the North-

West extend throughout the great valley of the Athabasca-Mackenzie and were abundant along the shores of the Arctic sea between the Mackenzie and the Coppermine River. Lignite had been found by Dr. Bell on the Moose and Albany Rivers, and it was also said to occur near Cumberland Bay. Bituminous coal was reported by the Arctic explorers on Bathurst, Melville and Prince Patrick's Islands and Bank's Land. Anthracite existed on Long Island in Hudson's Bay, but the quantity might not be great. Petroleum promised to be one of the most abundant mineral products of the North West. It was found at the surface in a more or less thickened condition along the Athabasca, Peace and Mackenzie Rivers and around Great Slave Lake, as well as at several localities in the interior. Dr. Bell considered that it was derived from the Devonian rocks, which constituted the great petroleum-producing system in Ontario and the United States, and he had no doubt but that good oil wells would be found by sinking down to these strata. The overlying sands and marls, of cretaceous age, were saturated with immense quantities of inspissated petroleum, even to a thickness of 150 feet. This mass would burn like coal, and it yielded large quantities of oil on distillation. The world might be supplied from these very extensive asphaltic deposits.

As to the metallic ores, those of iron were first noticed and the inexhaustible stores of carbonate of iron and manganese of Hudson's Bay were described. The ore is spread over the surface of thousands of acres on the Manitoulin Islands, which are close to the east coast. Dr. Bell had also found a great deposit of spothic iron with limonite at the surface, on the Mattagami River and another of magnetic on Knee Lake. He had induced the Indians of Athabasca Lake to search for iron ore, the result being the discovery of a mass of magnetic ore of fine quality. Captain Dawson of the circumpolar commission, at Dr. Bell's request, had looked for minerals on Great Slave Lake and had found a vein of specular iron. Massive iron pyrites, suitable for the manufacture of sulphuric acid had been discovered at Inari on Hudson's Bay. Copper pyrites had been met with on the east coast and near Lake Mistassini at the head of the Rupert River. The native metal was known to be abundant on the Coppermine River in rocks like those which contain it on the south shore of Lake Superior. Galena was found in masses, some of them of large size, disseminated through a bed of limestone, thirty feet thick, at Richmond Gulf and Little Whale River. Antimony had been noted by Richardson in the north, and zinc, manganese and molybdenum had been found by Dr. Bell on Hudson's Bay. He had also discovered traces of gold and silver in veins on the Eastmain coast. The extensive mountainous region between the mouth of the Mackenzie River and the Pacific Ocean, bordering on Alaska, was spoken of as a very promising one for the precious metals. Gold had been already discovered there. The conditions resembled those of Nevada and Colorado, and this great territory might one day become to Canada, as a mining region, what these States are to the American Union.

GENERAL MINING NOTES.

The Tolima gold mine of the Republic of Colombia, owned by an English company, is reported as having a gross product of \$88,847 for March of this year, at a cost of \$35,287, leaving a clear profit of \$52,500. At this rate the product for the year should be at least \$1,000,000, with a profit of about \$625,000.

The Ellen Harkins gold mine of Gympie district, Queensland, Australia, recently yielded in five weeks work from 71 tons of ore as much as 4,468 ounces of gold or about \$89,000 from which a dividend was paid of \$74,200.

El Callao, the famous gold mine of Venezuela, is reported as having produced and remitted to London for the month of April 18,038 ounces of gold worth about \$360,000 from which a dividend of \$6 per share was paid.

Investments in California gold mines are estimated at \$150,000,000; it is further estimated that up to January, 1884, the value of the total amount of gold mined has reached upwards of \$1,200,000,000.

Favourable news has been received from the lead and silver mines at Placentia, Newfoundland, which are said to be in a promising condition, the quality of the ore being excellent.

It is said that the Lake Superior region, embraced within the boundaries of the State of Michigan, has mined iron and copper to date to the value of \$370,000,000.

BRITISH COLUMBIA.

NANAIMO GOLD MINES.—Last fall a number of Chinamen were engaged in mining on the Nanaimo River and its tributary Boulder Creek. Last week Messrs. L. Page and J. Allen of Nanaimo visited the head waters of the River and its tributaries. They found that the Chinese had abandoned the diggings, apparently leaving in disgust. On Boulder Creek they had done but little work, while on Nanaimo River work was of an extensive character. There they had erected two large and substantial log houses, packing the timber at a depth of half a mile. On the gravel bank they had sunk ten or

twelve prospect holes down to the bed-rock, through tightly packed gravel and large boulders. The Chinamen had also run a tunnel a short distance into the hill. In neither place did they meet with any satisfactory results. Messrs. Page and Allen saw the rockers, long toms and sluices left by the Chinamen, also a pick stuck in a prospect hole.

This gravel bed is about a mile above Nanaimo River Falls and consists of packed gravel and boulders, while on the opposite bank of the river are high, almost perpendicular, bluffs of conglomerate rock.

Page and Allen did considerable prospecting but could only find the colour of very fine gold, which it would never pay to mine in such hard ground.

The Mongolians were led away by finding a good pocket or two when they first commenced operations, and consequently went into operations quite extensively. From the work done it is estimated there must have been from twenty to thirty working for several months.

The general impression is that paying diggings will yet be found on the Nanaimo River, and even now men are out there prospecting.

NOVA SCOTIA.

NOVA SCOTIA CONSOLIDATED GOLD CONCENTRATING COMPANY.—The work at Montague and Waverley will start up this month. This company was formed with a capital of \$100,000, by the consolidation of the interests of the Nova Scotia Gold Concentrating Company and of J. G. Foster & Co, for the purpose of working the quantities of rich mill tailings which abound in the various gold districts of the province. At present, the company has a concentrating plant at both Waverley and Montague, and chloridizing-work will be established on tide-water, at Dartmouth, during the summer. The Company is putting in two Golden Gate concentrators, five of the Embrey pattern, and two of Browne's patent. It has already bought upward of 100,000 tons of tailings.

WEST GORE ANTIMONY MINES.—Parties interested in these mines are trying to effect a sale. The mines, which up to the present time have been operated only in a small way by private means, are not yet developed sufficiently to demonstrate the character and probable extent of the vein, and a large quantity of ore being already exposed, the property has a present as well as a prospective value. The vein is a true fissure. As far as developed in the mine, or prospected on the surface, it shows an average width of thirteen inches solid metal. Two shafts, 120 feet apart, have been sunk on the vein to a depth of 110 feet, and short drifts of from 20 to 30 feet have been run east and west on the 60-foot level, while the two shafts are

connected by a drift at the bottom. Returns from three shipments of ore, aggregating 100 tons, made to Bath & Son, London, Eng., show 60 per cent. pure antimony, and netted a profit of \$30 per ton. From twenty to thirty tons a day can be mined with the present facilities, and the capacity of the mine can easily be increased by further development and improved methods of working. The mines are situated in Rawdon Township, Hants County, about fifteen miles distant from stations on either the Intercolonial or Windsor and Annapolis railroads. —(*New York Engineering and Mining Journal*).

EXPEDITION TO HUDSON BAY.

All arrangements for this important expedition have been completed and the *Neptune*, a wooden sailing steamship of about 600 tons, has been chartered from Job Bros., of St. John, Newfoundland, for the purpose. The vessel will sail from Halifax on or about the 15th of July and after coaling at Pictou will sail north. The expedition will be under command of Lt. Gordon, R. N. who will establish observatories and locate the parties, about six in number, at different points, the object of the expedition being to examine into the condition of the Hudson Straits during the winter months. Dr. Bell of the Geological Survey will accompany the party in the capacity of scientist and surgeon and will take assistants with him to aid in examining into the geological formation and mineral resources along the coast of Hudson Bay. This party will constitute a distinct branch of the expedition and will return about the end of October. The other six parties attached to the expedition will winter in the north and the *Neptune* will return for them in the spring.



NOTICE TO CONTRACTORS.

SEALED TENDERS, addressed to the undersigned, and endorsed "Tender for Wilson's Rock Works," will be received until Monday, the 30th day of June next, inclusive, for the construction of a block and beacon on Wilson's Rock, so called, River St. Mary, Georgian Bay, Ontario, according to a plan and specification to be seen on application to Adam Dudgeon, Inspector of Harbor Works, Collingwood, and the Department of Public Works, Ottawa, where printed forms of tender can be obtained.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque, made payable to the Honourable the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party decline to enter into a contract when called upon to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

By order,
F. H. ENNIS,
Secretary.

Department of Public Works,
Ottawa, 4th June, 1884.

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Waters and Products. Mines
Examined and Mills
started.

**NOTICE TO CONTRACTORS.**

SEALED TENDERS, addressed to the undersigned, and endorsed "Tender for Coal, Public Buildings," will be received until MONDAY, 21st JULY next, for Coal supply, for all or any of the Dominion Public Buildings.

Specification, form of tender and all necessary information can be obtained at this Department on and after the 24th instant.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque, made payable to the order of the Honourable the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party decline to enter into a contract when called upon to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

By order
F. H. ENNIS
Secretary.

Department of Public Works, }
Ottawa, 21st June, 1884. }

NOTICE TO MINERS.

POWDER, DUALIN, FUSE, DETONATORS,
STEEL, IRON, CHAIN, ROPE,
SHOVELS, PICKS, WHEELBARROWS,
And all Miners' Supplies For Sale at

THOS. BIRKETT'S,
Rideau Street, - - - Ottawa, Ont.

**ADVERTISEMENT.**

TENDERS will be received by the undersigned up to the hour of 12 o'clock noon on FRIDAY, the 14th day of July next, for the purchase of what is known as the

Pincher Creek Indian Supply Farm

situated some 30 miles south-west of Fort McLeod, in the district of Alberta, North-West Territories, containing about 3,000 acres. The farm has been occupied and cultivated by the Indian Department as a supply farm for the Piegan Indian Reserve, and will be sold in one block, with the improvements thereof.

During the past year it was leased by the Halifax Ranching Company. The soil is described by the surveyor who laid out the farm as being of superior quality, the herbage rich, and the water abundant and good.

The grain crops upon the farm are stated by the farmer of the Indian Department in charge, to have been excellent and to have ripened well.

There are upon the land a dwelling-house, granary, blacksmith's shop, cattle and hay corrals, sheds, barbed wire fence enclosing fifty acres, a deep well, and the land is partially drained.

Payment will be required to be made one-fourth in cash, and the remainder in three equal annual instalments with interest upon the unpaid balances at the rate of six per cent. per annum.

Each tender must state clearly the amount per acre offered, and must be accompanied by a cheque marked good by one of the chartered banks of Canada for 10 per cent. of the total amount of the price offered, the difference between 10 per cent. of the purchase money and the first instalment of one-fourth to be paid to the credit of the Minister of the Interior, on or before the 15th day of September next.

The lowest or any tender not necessarily accepted.

A. M. BURGESS,
Deputy of the Minister of the Interior.
Department of the Interior, }
Ottawa, 6th May, 1884. }

**NORTH-WEST MOUNTED POLICE.**

SEALED TENDERS marked "Tenders for Hay and Straw," and addressed to the Hon. the President of the Privy Council, Ottawa, will be received up to noon on WEDNESDAY, the 28th day of JUNE next, for furnishing Hay and Straw to be delivered at the Mounted Police Barracks, at the following places.

Regina	200 tons hay, 150 tons straw.
Fort Calgary	300 " " " 30 " "
Fort McLeod	300 " " " 130 " "
Maple Creek	75 " " " 25 " "
Medicine Hat	75 " " " 25 " "

Printed forms of tender, containing full information as to the articles and quantities required, may be had on application to the Department.

No tender will be received unless made on such printed forms.

The lowest or any tender not necessarily accepted.

Each tender must be accompanied by an accepted Canadian Bank Check for an amount equal to 10 per cent. of the total value of the articles tendered, for which will be forfeited if the party declines to enter into a contract when called upon to do so, or if he fails to complete the service contracted for. If the tender be not accepted the cheque will be returned.

No payment will be made to newspapers inserting this advertisement without authority having first been obtained.

FRED. WHITE,
Comptroller.

Ottawa, 8th May, 1884.

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**NOTICE TO CONTRACTORS.**

SEALED TENDERS addressed to the undersigned, and endorsed "Tender for Painting Ironwork, Parliament Grounds, Ottawa," will be received at this office until Thursday, 26th instant, inclusive, for Painting Ironwork of Fences,

Lamps, Gates, etc.

PARLIAMENT GROUNDS, Ottawa

Specifications can be seen at the Department of Public Works, Ottawa, on and after Monday, 16th instant.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque, made payable to the order of the Honourable the Minister of Public Works, equal to five per cent. of the amount of tender, which will be forfeited if the party decline to enter into a contract when called upon to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

By order
F. H. ENNIS,
Secretary.

Department of Public Works, }
Ottawa, 13th June, 1884. }

2 in.

**NOTICE TO CONTRACTORS**

SEALED TENDERS, addressed to the undersigned, and endorsed "Tender for a Breakwater, Port Arthur," will be received until Monday the 30th day of June next, inclusive, for the construction of a

BREAKWATER

AT

PORT ARTHUR, THUNDER BAY,

according to a plan and specification to be seen on application to John Niblock, Esq., Superintendent, Canadian Pacific Railway, Port Arthur, and at the Department of Public Works, Ottawa, where printed forms of tender can be obtained.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque, made payable to the Honourable the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party decline to enter into a contract when called upon to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

By order,
F. H. ENNIS,
Secretary.
Department of Public Works, }
Ottawa, 22nd May, 1884. }

**NOTICE TO CONTRACTORS.**

SEALED TENDERS, addressed to the undersigned, and endorsed "Tender for dredging River Kaminstiquia," will be received until Monday the 16th day of June next, inclusive, for dredging across the shoal at the mouth of the River Kaminstiquia, Thunder Bay, Lake Superior, according to a specification to be seen on application to John Niblock, Esq., Superintendent, Canadian Pacific Railway, Port Arthur, and at the Department of Public Works, Ottawa, where printed forms of tender can be obtained.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, the blanks properly filled in, and signed with their actual signatures.

The Department will not be bound to accept the lowest or any tender.

By order,
F. H. ENNIS,
Secretary.
Department of Public Works, }
Ottawa, 22nd May, 1884. }

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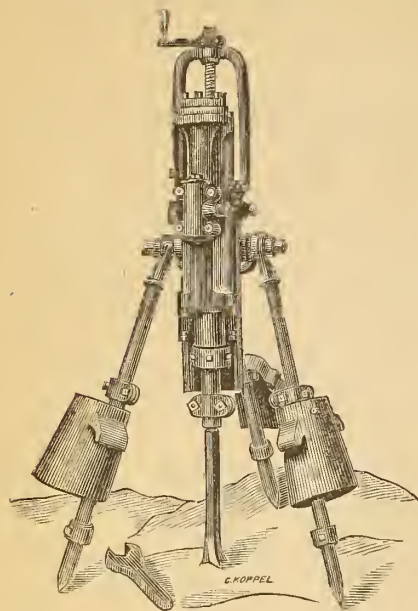
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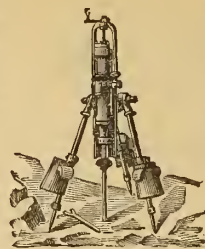
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S $\frac{1}{2}$ and N. E $\frac{1}{4}$	15	16	23	480
E $\frac{1}{2}$ of N. W $\frac{1}{4}$	15	16	23	80
S $\frac{1}{2}$	3	17	23	320
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CANADIAN MINING REVIEW

VOL. 2.—No. 7.

1884—OTTAWA, JULY—1884

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OFFICE:
UNION CHAMBERS, 14 Metcalfe Street.

The CANADIAN MINING REVIEW is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts as well as others interested in Canadian Mineral Lands are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 5th of the month it is to appear.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

The Directors of the *Austin Mining Company*, whose head office is at Ottawa, have recently employed Mr. E. D. Ingall, M.E., to examine the Company's property at Echo Lake. The full text of Mr. Ingall's report is to be found in this number of THE REVIEW, and it should be gratifying to the stockholders to learn that it coincides in its main features with Professor Chapman's report, made before the Company had accomplished the present developments to which Mr. Ingall refers, and which have enabled him to arrive at conclusions with comparative certainty. The position of the mine is most accessible,

and its situation affords unusually favourable shipping facilities, advantages which, together with the richness of the lode, should render it a very valuable property. We hope to hear at an early date that work has been resumed at this mine.

The Cleveland, Ohio, *Iron Trade Review*, referring to African iron ore, says:

"The shipment of iron ore from Africa to the United States is no new thing, but its present extent and future prospects present some new features of interest. From the consular reports made to the Department of State it appears that there were declared for the United States from Africa during 1883, 46,543 tons of iron ore. While this does not equal one-third of the average *weekly* receipts of Lake Superior ore at the single port of Cleveland, it is still of importance, since, according to these same reports, the exports from Africa last year to the United States exceeded those reported from our near neighbour, Canada, by 20,113 tons, being also in excess of our reported receipts from Spain and Portugal combined."

And continues:

"While under our system of Protection the importation of foreign ores must necessarily be restricted, a considerable increase may be looked for from Canada and Cuba, while Africa will doubtless play an important part in the world's production."

The iron ore deposits in Canada are in no wise inferior to those of Africa. On the contrary, the ore from some of our mines is used by American manufacturers in preference to that from any other quarter of the globe. African mine owners have the same duty to pay, while the difference in cost of

transportation to the iron manufacturing centres of the United States must be greatly in favour of Canada, and yet the amount of ore exported to the United States from Africa last year was nearly double the quantity exported from this country. Canadians might find it profitable to seriously consider the practicability of reversing the situation.

Dr. Selwyn, Director of the Geological Survey, has sent an expedition to explore the almost unknown country lying between the mouth of the Bersimis River and James Bay. Mr. A. P. Low is in charge as geologist with Mr. Bignell, of Quebec, as surveyor. Supplies are being forwarded *via* Lake St. John to the Hudson Bay post at Lake Mistassini, where it is expected the party will arrive by the close of the season. Exploration will be continued until the snow renders it impracticable, and during the winter the surveys will be proceeded with. It is expected that the section of country lying between the mouth of Bersimis River and the height of land will be gone over this year, and that by the close of 1885 this work will be completed through to Fort Rupert on James Bay along the course of Rupert River.

ENGLAND IMPORTING AUSTRALIAN COAL.—The recent arrival in Liverpool of several cargoes of gas coal from Australia, has excited a good deal of comment in the public press, and the matter has been made to assume an importance which it certainly does not possess. These cargoes can only be shipped profitably from the colonies when vessels going over are so absolutely short of freights that they have practically nothing else to carry, and the coal can consequently be

exported to England at almost a nominal cost; but that a regular competing trade could be established is out of the question. The coal itself is, however, remarkable for its gas making properties; it is extremely light, and is so full of gas that it could almost be forced out by the pressure of the hands, but it is altogether useless for any other purpose, it does not make a particle of coke, and it has to be largely mixed with other fuel.

Referring to an article which appeared in the MINING REVIEW in May last, wherein we found fault with Canadian capitalists for so persistently standing aloof from the mining industries of the country and thus permitting our most valuable mineral deposits to fall into the hands of our more go-ahead friends across the border, the *Iron Trade Review*, of Cleveland, Ohio, remarks:

"This is certainly a tribute to the enterprise and liberality of American capital that is worth having. What the outcome of this amalgamation of American enterprise with Canadian conservatism will be is one of the interesting problems for the future to decide."

The article in question was written more in the hope of stirring up the monied men of Canada to a sense of what their country reasonably expects of them than with intention to eulogize the liberality of American capitalists. While we greatly admire our neighbours for their enterprise and so-called liberality, we do not fail to observe a certain intermingling of shrewdness and caution which will, in all probability, protect them against ill-advised investments.

A blasting operation of unusual magnitude was conducted at the Pwllpant quarries, Caerphilly, Wales, on the 7th instant. A charge consisting of 16 cwt. of gunpowder was deposited in a hole 50 feet deep. The powder was ignited, and after a lapse of twenty minutes an explosion occurred which displaced an immense head of rock. In rolling down the great height, from the top to the bottom of the quarry, the rock was broken into pieces varying in weight from half a ton to five tons. The quantity of rock brought down by the blast is estimated at 10,000 tons.

The annual meeting of the stockholders of the Dominion Phosphate and Mining Co. was held at the office of the Company, 22 St. John Street, Montreal, on the tenth instant.

From what we can gather, the report of the Directors was of a satisfactory character. The expenditure hitherto has been made less with the view to extract large quantities of phosphate than to develop the mines and place them in such a condition that they can be worked henceforward economically and scientifically. This condition has now been attained, and the ore is now being extracted in large quantities from both mines, with the prospect of remunerating the shareholders amply for past delay. The purchase by the Company of the mine now known as the "Washington" is likely from present appearances to prove a most lucrative investment. Not only is the ore in great abundance, but the quality is of the highest standard. Altogether the prospects of the Company are very flattering.

THE PHOSPHATE INDUSTRY.

Each month brings fresh evidence of the rapid increase to the phosphate mining industry in the County of Ottawa. On the fourth of the present month, as will be seen by reference to another column, letters patent issued incorporating the "Lièvre Land and Phosphate Company," an organization whose operations will be watched with interest. The land owned by this Company is situated, for the most part, in the Township of Portland West and Templeton, in Ottawa County, and upon which some mining and a great deal of prospecting has already been done with encouraging results. In the Township of Bowman important discoveries have been made since the spring,

proving the existence of extensive deposits of apatite in this township. In the absence of railway communication, however, transportation from these deposits will be more expensive than from the mines in the district that are at present in operation, and yet a careful estimate of the cost shows that if the mineral can be cheaply mined there would remain a handsome margin of profit to the miner after defraying the cost of transportation from this isolated section, even at the present comparatively low value of phosphate.

The Dominion Phosphate Company held its annual meeting in Montreal on the 10th inst., and the directors' report to the shareholders was received with much satisfaction. Work on this Company's properties is progressing with most favourable results, and the quantity of phosphate that is being raised is daily increasing.

Mr. Allan's *Little Rapids* mine is yielding a quantity of excellent mineral. In the main shaft they are stoping in solid mineral at two levels, and each day's work adds to the body of phosphate in sight. This mine is capable of yielding a large annual output, and mining operations are being carefully conducted.

At the *High Rock*, the Union Phosphate Company's mines, and the *Emerald*, no change has been reported during the month. They are producing immense quantities of phosphate, and are continually increasing the facilities at the mines for mining and handling the output. The mines in Templeton and Wakefield are being steadily and profitably worked.

Phosphate Quotations.

Our London quotations have not varied since last month, and it is now thought that the present price for Canadian phosphate will rule for this season's shipments. 1s. 1d. is still quoted for 75 per cent., with a fifth of a penny rise, and it is confidently predicted by those who are familiar with the English market that miners will receive much better value for next season's output.

FREIGHTS.

For some weeks past very little tonnage from Montreal has been offered at rates to suit phosphate shippers. Six to ten shillings have been the prevailing rates, which is quite double what was paid earlier in the season, and as the principal producers availed themselves largely of the cheap spring freight they can now afford to carry their balance and await a drop from present rates when the autumn fleet will be going out.

Another Company Incorporated

To Operate in the du Lièvre Phosphate Region.

Under the "Canada Joint Stock Companies Act, 1877," letters patent have issued, bearing date the 4th July, 1884, incorporating Walter Richard Elmenhorst, John H. R. Molson, Robert C. Adams, James P. Cleghorn and William Costigan, of Montreal; Charles H. Trask, of New York; Amos W. Stetson, A. Forbes Freeman, John C. Haynes, and George W. Heard, of the City of Boston, for the purpose of mining, extracting, working, selling and shipping phosphates and other minerals in the Provinces of Quebec and Ontario, with power to purchase, acquire, retain, mine and dispose of lands and property yielding such minerals, and with power to acquire, construct and operate all manufactories, mills for grinding or otherwise treating such minerals, and generally such other works and undertakings as may be necessary or expedient for the mining, selling and transportation by land and water of such minerals, by the name of "THE LIEVRE RIVER LAND AND PHOSPHATE COMPANY (LIMITED)," with a total capital stock of seventy-five thousand dollars, divided into seven hundred and fifty shares of one hundred dollars.

Capt. R. C. Adams, of Montreal, having, during the past few years, acquired extensive areas of well selected phosphate lands in the neighborhood of Perth, Ontario, and in the Rivière du Lièvre district, Quebec, thought it expedient to organize a company for the purpose of developing his locations on an extensive plan, and with this object in view, he issued a prospectus some months ago; the incorporation of the Lièvre River Land and Phosphate Company has been the result. Capt. Adams is well and favourably known to the phosphate dealers in Canada and abroad; he has had many years of useful experience in mining phosphate in this country, on his own account, and, in his capacity of a shipping broker in Montreal, has enjoyed the benefit of being able to forward the output of his mines free of commissions on this side of the Atlantic. These are no insignificant advantages for a company to possess at the outset, and, according to the prospectus, Capt. Adams, who will, in all probability, be the managing director, agrees to devote his undivided attention to the company's affairs, and mining operations, as well as the handling of the output, will, therefore, be conducted under a system of economy and good management. The Lièvre River Land and Phosphate Company has our best wishes for a successful career.

The gold and silver product of California in 1883 is valued at \$15,752,750.

VILLENEUVE MICA MINE.

During the past month a force of miners have been engaged on this property, and the mine is developing into one of great extent—the crystals of mica are increasing in size as greater depth is reached and are more free from fracture—in fact the proportion of waste in the output up to the present time is comparatively small. Those who have had experience in mining this mineral are aware that but a small per centage of what is mined is capable of producing sheets of merchantable size. At this mine in Villeneuve, however, the crystals appear to lie in a less distorted form than elsewhere, and to be more free from twists and other damaging features. A large quantity of excellent mica has already been mined, most of which has been cut into sheets, ready for market, and when the mine has been further developed it will be capable of producing sufficient to supply a large demand.

Gold Mining in Beauce.

Messrs. Allan & Humphrey are now working in pay gravel at a depth of 150 feet in their mine near Slate Creek. Pan washings from the dump, taken out about six feet above bed rock, have proved very rich in fine gold, and the gravel below this no doubt carries coarser gold in large quantities, many nuggets, weighing an ounce and over, have already been found. Water for sluicing purposes is being brought from Slate Creek, about three-quarters of a mile, past the mouth of the shaft; sluices are in course of erection, and washing will be begun at an early date, the returns of which will be likely to astonish those who have had no faith in profitable mining in this section of country. The old river bed, where this shaft has been sunk, is a very large one, and the pay gravel will be proportionately abundant. In our next issue we hope to be able to give our readers the result of the first month's wash-up, and we venture to predict such rich returns as will induce thousands of miners to flock to the Beauce district and develop what is likely to prove one of the richest gold fields in America. Having seen the result of one day's pan-washing, we know whereof we speak.

According to the statement of Mr. Hayter, Government statist of Victoria, the total yield of gold in all the Australasian colonies, since its discovery in 1851, up to 1881 inclusive, has reached a value of \$1,446,247,255. Of this total Victoria, the smallest of the Australian colonies, has contributed \$1,010,111,340.

REPORT ON THE AUSTIN COPPER MINE.

To the Directors of the Austin Mining Company,
(Limited) Ottawa, Ontario.

SIR,—Having proceeded to your company's mine at Echo Lake, in the Garden River Indian Reserve, and spent several days there surveying and examining it, I beg herewith to submit my report of the results of the examination.

SITUATION AND COMMUNICATIONS.

These two features can be well understood by reference to Mr. Austin's map of the property and the locality. Sault Ste. Marie is the nearest place of any size, and is distant about 25 miles by water down the Sault River to Lake George (or the mouth of the Echo River could be reached by driving from the Sault), up Echo River about three miles, and about three miles across Echo Lake to the mine dock, from which there is about a mile of well graded road to the mine. This route could be rendered available for craft drawing 6 or 8 feet of water by doing a slight amount of dredging at the mouth of Echo River, and about 100 feet where the lake discharges into the river. Were this done the communications would be excellent and the ore from the mine could be readily and cheaply brought down from Lake George, from whence it could be shipped through to Chicago or any points on the lakes, or to England. A light draft tug makes occasional trips at present up as far as the bar at Echo Lake. In winter communication would also be good. From Sault Ste. Marie to the mouth of Echo River on the Bruce Mines Road, up a winter road which has been cut to Echo Lake, and thence across the ice to the mine dock. There is a mail three times a week, or oftener, to a post-office at the mouth of Echo River, which would, no doubt, be improved were the mines working, and communication could also be made at this point with the C. P. R. telegraph system, were it necessary. The summer route by water is all sheltered, so that shipments need never be delayed by bad weather. A good location could be found for a tramway to the dock at Echo Lake down a gully that runs directly from the mine. By putting in a suitable track the full car descending from the mine could, I think, be made to draw up the empty one. Ore bins could be erected here, from which the barrels could easily be filled, and into which self dumping cars could dump the ore which would reduce the cost of handling and tramming to a minimum.

DEVELOPMENTS.

The vein on which work has been done is a strong and well defined lode, carrying sulphides of copper and iron in a quartz gangue. It is very favourably situated for testing cheaply and also for working. It runs into the side of a hill with an average strike, as far as shown by the present developments, of about N. 35° W., although it varies considerably from this at different points. In dip it also varies much, but averages about S. 55° W. In places it is 8 feet thick and in others it gets much broader, appearing from the surface croppings to widen out to 20 or 25 feet. *The accompanying map and section of the mine will show you the position and relative level of the various openings made on the vein which I now propose to describe more in detail.

THE TUNNEL.

This is a drift on the course of the vein at a point some 250 feet below its highest level on the property. It has been driven for a distance of 85 feet. The lode here is not so productive as at the other openings, and seems much disturbed, but, as the end has only some 25 feet of vein above it, it will most likely improve much as it reaches deeper ground and approaches the better portions of the vein at 1 and 2 shafts. It has, however, yielded occasional good stones of ore as evidenced by the dump and breaking rock right along the level. The vein dips here about 65° and is 8 to 10 feet wide.

NO. 1. SHAFT

is a small exploratory shaft about 6x6 and some 25 feet deep. From this point croppings show for about 100 feet down towards the tunnel. This opening turned out a good quantity of ore. An examination of the dump shows the vein to have been much improved in yield, settled and without the admixture of country rock found in the tunnel.

POINT W

is a small hole showing no ore, but the quartz here is white and opaque and similar to that found on the foot of the vein at opening Z, which, with other evidence, leads me to believe the real vein lies to the west of this spot in a hollow filled with soil.

*The map and section referred to can be seen at the Company's Office, Ottawa.

POINT X.

Here a trench has been excavated across the outcrop of the vein, about 20x5x5 ft. deep. It shows much ferruginous gozzan from atmospheric action on the back of the lode. In the E. half iron pyrites appears to predominate, but the W. half shows the regular copper bearing quartz of the lode. Notwithstanding atmospheric alterations, the trench has turned out some good ore and the vein looks promising.

POINT Y.

A trench about 20x5x8 ft. deep, excavated across the run of the vein. No definite hanging or foot walls shown as vein rock appears to be still standing to east of trench. The lode is about 25 ft. thick here and shows the same ferruginous gozzan as at X. This opening has yielded quite a quantity of good ore and the vein looks well. A band of iron stained croppings extends on a course of S. 15° E. from here towards X for 30 or 40 feet.

NO. 2 SHAFT.

About 10x12x32 feet deep. It is sunk on the foot wall which is here well defined and dips 52° from the horizontal, whilst the strike approaches a more E. and W. direction.

The vein looks well at this point, and there is a good showing of ore on the dump, which occurs in large and stronger masses in the vein matter. There is still vein standing to the hanging of the shaft.

OPENING Z.

A small pit 10x10x6 ft. deep which appears to be in the middle of the vein as neither foot nor hanging wall shows. The width would be about 15 to 20 feet here. Three bands show here: on the foot wall side is white opaque quartz, as in opening W., above which lies some 6 feet of looser rock stained with iron oxide and copper carbonates (from atmospheric action on the other ores of copper and iron) whilst above this the pit is 4 feet in a band of quartz with disseminated ore and occasional large pieces. The vein looks very well also at this point.

SITE FOR FLOORS.

An excellent site could be selected for dressing floors near the mouth of the tunnel where the ground drops away at a good angle to arrange them advantageously, so that the ore would pass through with the minimum of handling, whilst water could be supplied from the little creek running past the place and from the small lake above in which it takes its source.

SUMMARY.

On your property you have a good, large, and well defined vein which is very favourably situated for testing and working. The underground developments are, as far as they have gone, satisfactory in their results and would encourage and justify a further expenditure which, from present appearances, would open up a large quantity of good ore and enable the erection of dressing machinery to be proceeded with with confidence. I would suggest that the tunnel be continued on and that both shafts be sunk to meet it. The sinking of No. 1. would be necessary on account of ventilation, and would be advantageous as giving another point at which to start stoping.

The proposed work would require a force of 30 to 35 men, for whose accommodation very little addition would be required to the present boarding-house. A small steam hoist would be required for the shafts, which, with another steam drill, air compressor and tank for the two, would be the chief additions necessary to the present plant. A couple of teams would also be required, but these could probably be hired from the surrounding farmers.

With this force, at the end of about a year, or little more, you would have a large stock of ore opened up and the ground well proved, and should these developments prove as satisfactory as the vein now promises you would be able to direct all your attention to the erection of dressing machinery, which could be supplied with ore immediately on completion.

A great deal of surface work has been done on the property, such as is always necessary in like districts before one can commence mining work, such as clearing bush, making roads, erection of buildings, &c., &c., so that there need be little delay on that account in starting work again on the mine as advised. The details of these surface improvements are given in the accompanying appendix.

I remain, sir,

Your obedient servant,

(Signed) ELFRIC DREW INGALL,
Associate Royal School of Mines,
London, England.

APPENDIX.

SURFACE IMPROVEMENTS.

The position of the buildings, etc., is shown on the plan. They are all well built and in good order. They are as follows:

No. 2 Shaft House: A small plank building 15 x 10. No. 1 Shaft House: A small log building about 12 x 10.

Smith Shop: Built of logs, 18 x 10, contains forge, bellows, anvil, hammers, etc., ready for use, and a great many other tools in fairly good order.

Engine House: About 20 x 15, built of logs, contains 6 x 3 vertical boiler complete and in apparent good order, one steam drill and drills, tunnelling shaft, about 70 feet of steam hose, small portable forge and about 200 feet of iron pipe.

Stable: A log building 28 x 18, with half storey loft above.

Office and Manager's House: A good building, built of hewn logs, 25 x 22, three rooms on ground floor and a half storey loft above.

Boarding House: Good hewn logs, 30 x 25, large dining-room, kitchen and pantry on ground floor and half storey sleeping room above. This house could accommodate 20 to 35 men.

Store Shanty: Built of rough logs, 17 x 14.

Cordwood: Near the houses there are about thirty cords of good stove wood.

Clearing: There is a clearing round the houses of some four or five acres in extent, of which about an acre is fenced in, which produces good hay.

Warehouse: Situate near the dock at Echo Lake, about 20 x 25, built of frame and plank, with shingle roof.

Dock: A small temporary dock, about 30 x 15. A good dock could easily be built here. Neither of these two latter are on your property.

Cordwood Supply: I think some could still be gathered handy to the mine, and in winter further supplies could be teamed across the lake from any point where it was handy, or brought by scow in summer.

Average Sample: The barrels of rock sent you represent the average of the vein as proved at two representative points, viz., Nos. 1 and 2 shafts. Of course in actual work a certain proportion of poor rock could be selected out and thrown away at the shaft mouth. At each place some 5 or 6 cwt. of rock was selected from all parts of the dump, so as to represent in due proportion each class of rock there. This was spalled down, thoroughly mixed and the sample taken from it. Eventually all the rock was taken.

Materials: Besides the plant already mentioned, there were in various buildings 4 heating stoves and 1 cooking stove (No. 9), with pipe and many utensils, small hand pumps, 2 iron kettles, about 70 feet of good windlass rope, 2 windlasses, dirt and water buckets, some drill steel, a large sleigh, some cross-cut saws, and various other tools, and about 200 to 300 feet of good tarred 1-inch hemp rope.

(Signed) E. D. INGALL.

KAOLIN.

Discovery by the late Mr. William L. Holland.

A few years ago two valuable deposits of kaolin were discovered by the late Mr. Holland, of Ottawa, on the Gatineau River, in the Township of Low. They had been known by the settlers and lumbermen for many years as "The Paint Mines," and were supposed to be ochre. While passing down the river in a bark canoe Mr. Holland noticed the clay, procured samples of the four colours that he found there—yellow, red, bluish grey and white—and had them tested and found that they were kaolin of a very good quality. He sent a sample to Mr. Livesley, of the St. John's Pottery, who worked some of it into a small piece of white ware which he forwarded to Mr. Holland with a letter in which he stated he had the pleasure of sending him the first piece of white ware ever made in Canada from native clay. Mr. Holland, son of the late discoverer, Mr. Brennan, of Ottawa, and a gentleman of Toronto have recently purchased the property on which the deposits occur, and are now the owners

of the only beds of kaolin of any extent known to exist in Canada. With the construction of the Gatineau Valley Railway there will be a grand opening afforded here for the manufacture of vitrified tiles, fire-brick and pottery. Firewood is abundant in the immediate vicinity and magnificent water-power is within a few yards of the clay beds.

Kaolin is a name applied to a pure white clay which forms an important ingredient in the manufacture of porcelain, and which is therefore known as *china clay*. Large quantities are raised in Cornwall, England, where it is frequently termed *Cornish clay*. This clay was first sent to Europe from China under the name of kaolin in the early part of the last century. A similar white clay was soon afterwards found in Saxony and was used in the manufacture of porcelain, thus laying the foundation of the factory at Meissen for producing the famous Dresden china. It was first detected in Cornwall in 1755, a discovery which resulted in the manufacture of a hard paste china at Plymouth and Bristol. Kaolin is found in Nebraska and in several of the eastern States of the American Union. It is almost invariably a product of the alteration of feldspar, and is therefore

always found in association with feldspathic rocks, usually granite. The china clay rocks of Cornwall and Devon are simply granites in which the orthoclase-feldspar has become decomposed or kaolinized. The localities from which kaolin is obtained in Great Britain are all situated in Cornwall and Devon. In the former county the workings are principally in the neighbourhood of St. Anstell, St. Stephen's and Breague, while in Devon they are situated at Lee Moor and Meavy, on the south of Dartmoor.

China clay, *kaolin*, is not only used in the manufacture of pottery, but is also extensively employed by the paper maker and the calico bleacher. It is likewise used to a small extent in the manufacture of alum, artificial ultra-marine and some other chemical products. In 1880 the quantity of china clay raised in Cornwall amounted to 278,572 tons, and in Devon to 25,370 tons.

STRONTIA.

We observe it noted in many of the mining journals that there has sprung up a considerable demand in England for this article among the manufacturers of fire-works, by whom it is very extensively used. We are not aware of its occurrence in Canada.

Strontium is one of the metals of the alkaline earths, occupying an intermediate position, as regards many of its properties, to calcium and barium, the other members of the group. It is less abundant in nature than barium, and occurs as a constituent in the minerals strontianite and celestine, which are respectively the carbonate and sulphate. In the metallic state it is usually white, heavy, oxidisable in air, and decomposing water at ordinary temperatures. The most important compound is *strontia*, from which the metal was first obtained in 1808 by electrolysis. It resembles baryta, forming a white soluble hydrate, which is the compound formed when the metal decomposes water. Strontium and its components burn with a very characteristic crimson flame, which gives a well marked line or banded spectrum.

THE MINING REGULATIONS.

The Deputy Minister of the Interior, Mr. A. M. Burgess, has returned to Ottawa after a month's absence, during which time he paid an official visit to Manitoba and the North-West Territories with a view to acquainting himself with the country and the requirements of its settlers. Mr. Burgess was unfortunately the victim of a serious accident during his trip, from the effects of which he is yet suffering,

but, notwithstanding the inconvenience to be experienced from a broken arm, a disabled leg and a general shaking up, he succeeded, in a great measure, in accomplishing the object of his mission. Since the publication of the mining regulations many complaints have been made by miners in and about Calgary, and farther to the westward, on account of the supposed severity of many of the clauses. Deputations waited on Mr. Burgess at various points along the line of the C.P.R. where he stopped, and the many points at issue were carefully and exhaustively discussed. The Deputy Minister is satisfied that he has successfully set aside all misapprehension and dissatisfaction that had existed among miners and prospectors, as regards certain clauses which will remain unchanged, and after considering the objections to certain other clauses he has decided to recommend modifications which cannot fail to remove all ground for complaining in the future. The clauses which Mr. Burgess proposes to amend are No. 3, sub-section C. of Clause No. 4, and Clause No. 5, of which the paragraphs to be amended at present read as follows:

No. 3.—"Its surface boundaries shall be straight due north and south and east and west lines not more than four in number."

Sub-Sec. C. Clause No. 4.—"This receipt shall authorize the claimant, his legal representatives or assigns, to enter into possession of the location applied for, and, during the term of *one year* from its date, to take therefrom and dispose of any mineral deposit contained within its boundaries."

Clause No. 5.—"At any time before the expiration of *one year* from the date of his obtaining the agent's receipt as aforesaid, it shall be open to the claimant to purchase the location, on filing with the Local Agent proof that he expended not less than *five hundred dollars* in actual mining operations, etc."

AMENDED—*Clause No. 3.*—"Its surface boundary lines shall not be more than four in number and opposite sides shall be parallel."

Sub-Sec. C.—"And during the term of *five years* from its date, etc."

Clause 5.—"At any time before the expiration of *five years* from the date, etc., on filing with the Local Agent proof that he has expended not less than *two hundred dollars*, etc."

These modifications are all in favour of the prospector, and, if approved of by the Minister, will be made with a view to encouraging exploration and prospection. Those

clauses which Mr. Burgess insists shall remain as they have been framed after careful enquiry into the effect of similar regulations in force in other countries, and any departure therefrom has been made for the mutual benefit of miners and the Government to the exclusion of litigation and the legal profession.

THE BRITISH ASSOCIATION

ITS MEETING IN MONTREAL.

The Mines to be Visited

On Saturday, the 19th inst., the first contingent of members of this important scientific organization, including Capt. Trevelyan Pim, R.N., with their wives, daughters and other ladies, left London for Liverpool en route to Canada to attend the annual meeting of the Association, to be held in Montreal on the 27th of August. The British Association for the Advancement of Science is unquestionably the most important scientific organization in the world, and, as the date appointed for its annual meeting draws near, the people of Canada, especially the citizens of Montreal, begin to have some appreciation of the great honour that has been conferred upon us by the selection of Montreal as the place where the members of the Association are to assemble for their session of 1884. Among its eight hundred members the Association boasts of men eminent in science, literature and the arts, whose names are familiarly known the world over, and as many important discoveries have been announced at their annual gatherings, the meetings attract the attention of the scientific world, and the proceedings are watched with profound interest. Prominent amongst the members of the Association are the following distinguished gentlemen: The Right Hon. Lord Raleigh, M.A., D.C.L., F.R.S., F.R.A.S., F.R.G.S., the President-elect; Capt. Trevelyan Pim, R.N., to whose persistent efforts the decision to hold this meeting in Montreal is mainly due; Sir William Thomson, LL.D., D.C.L.; Sir Joseph Dutton Hooker, K.C.S.I., M.D., C.B., F.R.S., F.L.S., F.G.S., D.C.L., LL.D.; Sir John Lubbock, Bart.; Sir Lyon Playfair, K.C.B., M.P., LL.D., F.R.S.; Sir Richard Temple, Bart.; Henry Morley, Esq., Henry Enfield Roscoe, F.R.S., LL.D.; Lieut. General Sir John H. Lefroy, C.B., K.C.M.G., R.A., F.R.S., F.R.G.S.; Leone Levi, F.S.A.; Edward Joseph Lowe, Esq.; Dr. Henrici, of Heidelberg University; James Glaisher, Esq., the famous aeronaut; John S. B. Sanderson, M.D., LL.D., F.R.S.; Vice-Admiral Sir Erasmus Ommaney, C.B., F.R.S.; Edward

Frankland, M.D., D.C.L., Ph.D., F.R.S., F.C.S., of the Royal School of Mines; John Hall Gladstone, Esq.; George H. Darwin, M.A., F.R.S., F.R.A.S.; William Boyd Dawkins, M.A., F.R.S., F.G.S., F.S.A., the eminent geologist; John Church Adams, F.R.S.; Henry Bastian, M.D., M.A., F.R.S., F.L.S.; William Carruthers, F.R.S., F.L.S., F.G.S.; James Dewar, M.A., F.R.S.; Robert Stawell Ball, LL.D., F.R.S.; Dr. John Ball, M.A., F.R.S., F.L.S., M.R.I.A.; Joseph Henry Gilbert, Ph.D., F.R.S., F.C.S.; the Earl of Rosse, B.A., D.C.L., LL.D., F.R.S., F.R.A.S., M.R.I.A.; J. F. Latrobe Bateman, M. Inst. C.E., F.R.S., F.G.S., F.R.G.S.; H. Baneriman, F.G.S.; Rev. J. F. Blake, M.A., F.G.S.; W. T. Blanford, F.R.S., F.R.G.S.; Rev. Thomas G. Bonney, D.Sc., F.R.S., F.S.A.; A. G. Vernon Harcourt, M.A., F.R.S., F.C.S.; Capt. Douglas Galton, C.B., D.C.L., F.R.S., F.G.S., F.R.G.S.; William L. Carpenter, B.A., B.Sc., F.C.S.; Rev. W. H. Dallinger, F.R.S., F.L.S.; Lieut.-Col. John Herschel, R.E., F.R.S., F.R.A.S.; Thomas Rupert Jones, F.R.S., F.G.S.; William H. Perkin, F.R.S.; Robert H. Scott, M.A., F.R.S., F.G.S., F.R.M.S.; W. Chandler Roberts, F.R.S., F.G.S., F.C.S.; Sir F. J. Bramwell, F.R.S., M. Inst. C.E.; George F. Fitzgerald, M.A., F.R.S.; R. T. Glazebrook, M.A., F.R.S.; G. D. Liveness, M.A., F.R.S., F.C.S.; Rev. S. J. Perry, F.R.S., F.R.A.S., F.R.M.S., and others.

That the scientific men of Canada, and others, are to be given an opportunity of personal intercourse with such gentlemen as those we have named, who are numbered among England's most prominent men, is an event that is not likely to occur again for many a long day, and it is to be hoped that this visit of the members of the Association will be a permanent benefit to the Dominion. During their stay in Canada, Ottawa will be visited by a very large number of the members, and it has been arranged that those who are interested in such matters will be given an opportunity to visit the mineral bearing sections of the Ottawa district and the mines that are in operation. No amount of newspaper advertising could so effectively attract the attention of the outside world to our phosphate and iron deposits as a personal visit of these scientists. It behoves owners of mines to afford these distinguished gentlemen every facility to carefully examine the properties they will visit, and to see that they are received in a manner that will do credit to Canadian miners and will render their visit enjoyable and interesting. After visiting the phosphate mines in the du Lièvre district it is expected that the party will proceed to the iron mines of Central Canada.

LAKE OF THE WOODS GOLD MINES.

Most recent advices from Rat Portage report that the interest in the Lake of the Woods mines is steadily and rapidly increasing. Miners, prospectors and capitalists, or their agents, are daily arriving, and all are apparently anxious to at once engage in the mining enterprises of the district. As the mineral veins are more thoroughly prospected and tested, confidence in their permanent value becomes more firmly established, and it is expected that the capital required for their development will be forthcoming in the near future. The "Winnipeg Consolidated" is spoken of as a property of great promise, and it is to be deplored that lack of capital should retard active operations at this mine. Its owners are wasting valuable time this summer in not resuming work. A mine capable of producing ore that will pay from \$50 to \$200 a ton should not be idle.

Pine Portage mine is working night and day crushing high grade ore, which is yielding beyond all expectations.

It is reported that negotiations are in progress for the sale of the Sultana location. This property, when opened up, will probably develop into a mine that will compare with the Keewatin and Pine Portage.

An inspection of the Paragon location has been made, and about 200 pounds of quartz taken from the lode, which is being tested, and if the result is satisfactory steps will be taken to open the mine at once.

The Lake of the Woods Company's stamp mill at the Argyle location has been kept going pretty steadily of late, and about twenty tons of Keewatin ore has been crushed. From this amount of rock about \$100 amalgam was taken from the plates, leaving nearly \$2,000 in the concentrates. This showing gives a result of over \$100 to the ton, which, considering it is all surface ore, is exceedingly rich and gives great promise for the future.

MINING IN NEWFOUNDLAND.

Latest advices from Placentia report that Mr. C. S. Fowler, of the Anglo-American Telegraph Co., an expert in mining, after disposing of a valuable property, known as the Cliff Silver Mine, to a London syndicate, has been developing other properties in the neighbourhood of Placentia. Black Point has an immense deposit of gold, silver, lead and blende, with thousands of tons in sight. Ship Harbor has a very fine prospect of gold, silver and lead, with good ore streaks. Block House Mine, Great Placentia, vein assays eight and one-sixth ounces gold, same quantity silver, with magnificent lode on same property

of 22 feet in width, containing gold, silver and lead. At Cape St. Mary's two fine ore streaks, 12 inches wide each, rich in gold, silver and lead, have been discovered. Also several other prospects, all owned by Mr. Fowler, not yet developed. Messrs. Henderson and Sinnott recently discovered at Little Placentia Sound an extensive galena mine. The Cliff Silver Mine is exceedingly rich in gold and silver, highest silver assay 400 ounces with \$50 worth of gold. Mr. Fowler has shown wonderful perseverance in opening up this property, which promises to make him a bonanza king.

GENERAL MINING NOTES.

Arizona will probably produce, during the present year, 20,000,000 pounds of copper.

The Lake Superior, U.S., mines have produced copper and iron, from 1856 to 1883 inclusive, valued at \$370,000,000.

The total annual American product of gold and silver is \$80,000,000. The entire world's annual product is \$160,000,000, or double that of America.

The Director of the Mint, in his last annual report of gold and silver production in the United States, mentions that the product of Colorado for 1883-84 is nearly \$25,000,000.

The value of the minerals exported during 1883 from New South Wales was £2,438,826, the metals included gold, silver, silver-lead ore, copper, tin, iron, coal, bismuth, manganese, kerosene shale, pyrites, and antimony.

An explorer has recently returned from Victoria, B. C., and states that the reported mica deposits in that province are very small and of no commercial value. Another explorer, after searching for this mineral for fifteen days on Battle River, met with no practical encouragement.

It is reported that work has been resumed at the Coxheath Copper Mines, near Sidney, Cape Breton, N.S. The Inspector of Mines for the Province of Nova Scotia, in his official report for 1883, says: "During the past summer the Coxheath Copper Mining Company did a great deal of work, their levels were extended and a good deal of ore stoped out. A few tons of this were hand-picked and sent away for testing. Experiments were made on the low grade ores, and it is stated that preparations are being made for the erection of a large concentrating plant in the spring. Some of the copper was found to carry 80 oz. of silver to the ton."

Incorporated Dividend-Paying Mines of the United States.

NAME AND LOCATION.	Latest quotation per share.	Current value of Mine.	Number of Shares.	Par Value.	Capital Stock. Dollars.	Last Assessment.		No. of Assessment.	Total Assessment to date.	Last Dividend.		No. of Dividend.	Total Dividends to Date.
						Date.	Amount per Share.			Date of Payment.	Amount per Share.		
Alice Gold & Silver Mining Co., Montana...	\$2 65	\$1060000	400000	\$25	10000000	not assessable.				June 2, 84....	12½	11	\$450000
Amie Con. Mining Co., Col.....	6	30000	500000	10	5000000					October 2, 83....		7	330000
Atlantic Copper M. Co., Michigan.....	7 25	290000	40000	25	1000000	April 5, 75....			180000	Feb. 1, 84....	1 00	5	269000
Bassick Mining Co., Colorado.....	6 50	650000	100000	100	10000000					March 5, 84....	1 00	5	425000
*Black Bear Quartz Gold M. Co., California..			30000	100	3000000				15000	Dec. 28, 83....	20	84	887000
Boston & Montana Gold M. Co., Montana....			200000	10	2000000					Jan. 10, 83....	05	17	310000
Bodie Con. Mining Co., California.....	2 25	225000	100000	100	10000000	December 21, 83		4	200000	July 7, 84....	1 00	26	1570000
Bulwer Con. Mining Co., California.....	41	41000	100000	100	10000000	December 12, 77		1	30000	Jan. 31, 84....	10	19	175000
Bonanza King, California.....	10 12	1125000	100000							May 15, 84....	25	6	150000
Consolidated Gold Mining Co., Georgia.....			100000	5	500000	not assessable.				Dec. 20, 83....	02	29	110000
California Gold Mining Co., Gilpin Co., Col.			130000							August 13, 83..	25	2	65000
Calumet & Hecla Copper M. Co., Michigan..	14400	14400000	100000	25	2500000		15 00		1200000	Feb. 15, 84....	5 00		24850000
Carbonate Hill Mining Co., Col.....	30	60000	200000	10	2000000					April 1, 84....	05	8	80000
Catalpa Mining Co., Leadville, Col.....	25	75000	300000	10	3000000	not assessable.				June 16, 84....	10	6	270000
Central Copper M. Co., Michigan.....	8 25	165000	20000	25	500000	Sept. 10, 61....	65		100000	Feb. 1, 84....	2 00	22	1710000
Christy Mining Co., Silver Reef, Utah.....			60000	100	6000000	Mar. 19, 84....	80	2	60000	Feb. 9, 83....	10	15	90000
†Contention Company, Arizona.....			250000	50	12500000					Dec. 24, 83....	25	19	1125000
Copper Queen Mining Co., Bisbee, Ariz.....			250000	10	2500000					April 18, 84....	40	19	1225000
Cosmopolitan Mining Co., Utah.....			100000							April 3, 84....		3	75000
Crescent Mining Co., Utah.....			600000							October 25, 83.	05	4	150000
Deadwood-Terra Mining Co., Black Hills...			200000	25	5000000	not assessable.				Jan. 20, 83....	10	26	\$900000
Dean Mining & Prospecting Co., ot Col.....			100000							Dec. 1, 82....	50	1	50000
Derbec Blue Gravel Mining Co., Cal.....			100000							June 23, 84....	10	4	40000
Dunkin Mining Co., Col.....	13	26000	200000	25	5000000					October 2, 83....		16	210212
Evening Star Mining Co., Col.....			50000	10	500000	not assessable.				October 25, 83..	50	56	1400000
Eureka Con. Silver M. Co., Nevada.....	2 25	112500	50000	100	5000000	Jan. 15, 84....	1 00	7	350000	July 27, 82....	25	25	4817500
Father DeSmet Con. Gold M. Co., Dakota...	4 45	445000	100000	100	10000000	Nov. 13, 78....		2	200000	July 31, 84....	20	35	820000
Franklin Copper Mining Co., Mich.....	6 50	286000	440000			June, 77....			360000	Jan. 1, 84....	2 00		320000
Grand Central Mining Co., Tombstone, Ariz.			100000	100	1000000					December, 82...	50	16	800000
Great Western Quicksilver M. Co., Cal.....			50000	100	5000000	August 25, 73..	15		35500	October, 82....	25		262500
Hecla Con. Mining Co., Montana.....			30000	50	1500000					July 1, 84....	50		612500
Homestake Mining Co., Deadwood, Dakota..	9 50	1187500	125000	100	12500000	April 8, 78....		2	200000	July 25, 84....	20	71	2412500
Holyoke Mining Co., Idaho.....			200000							Nov. 19, 83....	02	14	58000
Horn Silver Mining Co., Utah.....	5 75	2300000	400000	25	10000000	none.....			none....	May 15, 84....	75	13	3400000
Hope Mining Co., Montana.....			8000							July 1, 84....	1 50	11	146947
*Idaho Gold M. Co., (Grass Valley) Cal.....			3100	100	310000					July 16, 84....	7 50	174	3504550
†Indian Queen Mining Co., Nevada.....	20	60000	300000	2	600000	Feb. 11, 80....	15	3	12000	July 2, 83....	03	31	374000
Iron Silver Mining Co., Leadville, Col.....	1 00	500000	500000	20	10000000					Jan. 9, 84....	20	13	1300000
Jocustita Mining Co., Mexico.....	5 00	500000	100000	100	10000000					March 31, 84....	50	12	1050000
Kentuck M. Co., Nevada.....			30000	100	3000000	Nov. 23, 81....		17	342000	June 19, 84....	10	47	1294000
La Plata Mining & Smelting Co., Col.....			200000	10	2000000	not assessable.				October 2, 82...	30	35	610000
Leadville Con. Mining Co., Col.....	25	100000	400000	10	4000000	"				Dec. 20, 83....	05	18	370000
Lexington Mining Co., Montana.....			40000	100	4000000					June 23, 84....			565000
Little Chief Mining Co., Col.....	30	60000	200000							May 30, 84....	10	10	760000
Mt. Diablo M. Co., Nev.....	2 00	100000	50000			June 22, 80....		3	137500	November 25, 83	25	4	50000
Mt. Pleasant M. Co., Cal.....			150000	1	150000					March 31, 84....	10	5	105000
Morning Star Con. M. Co., Leadville, Col...			100000	10	1000000					July 1, 84....	25	20	740000
Napa Con. Quicksilver, M. Co., Cal.....	75	75000	100000	7	700000	not assessable.				November 1, 83	20	30	310000
Navajo Mining Co., Tuscarora, Nevada.....	4 00	400000	100000	100	10000000	March 7, 82....		10	255000	May 14, 83....	25	9	225000
*New York Hill Gold Mining Co., Cal.....			50000	100	5000000	March 26, 78....	20	6	55000	August 10, 82..	10	21	215000
Northern Belle Milling & Mining Co., Nev..	07	3500	50000	100	5000000	Jan. 30, 84....	8 00	2	425000	April 16, 83....	50	71	2512500
Ontario Mining Co., Utah.....	20 00	3000000	150000	100	15000000				none....	June 30, 84....	50	96	5600000
Osceola Con. Copper M. Co., Calumet Dis Mich	11 00	550000	50000	25	1250000					July 1, 84....	50	19	1060000
Original Mining Co., Britte, Montana.....			60000	25	1500000	not assessable.				June 5, 84....	05	34	102000
Oxford Gold Mining Co., Nova Scotia.....			100000							Dec. 10, 83....	03	10	30000
Paradise Valley Mining Co., Cal.....			100000	100	10000000					April 28, 84....	19	3	30000
Pleasant Valley Mining Co., Cal.....			100000	100	10000000	Mar. 3, 84....	10	3	40000	Dec. 15, 82....	05	6	50000
Plumas Eureka Gold Mining Co., Cal.....	7 50	304687	140625	10	1406250					April, 84....	50		1687488
Plymouth Con. M. Co., Cal.....			100000							May 5, 84....	50	12	600000
Quincy Copper Mining Co., Michigan.....	36 00	1440000	40000	25	1000000		15 00		200000	Feb. 20, 84....	4 50	31	3790000
Richmond Con. Silver M. Co., Nevada.....	†21 25	1147500	54000	25	1350000					August 10, 83..	1 25	36	3974887
San Francisco Copper M. Co., Cal.....			50000							Feb. 20, 83....	05	11	27500
Sierra Bella Milling Co., New Mexico.....			20000	25	5000000	not assessable.				May 1, 84....	1	15	30000
Sierra Buttes Gold M. Co., Cal.....	6 25	765625	122500	10	1225000	paid up				April, 84....	12½		1360288
Sierra Grande M. Co., New Mexico.....	65	260000	400000							July 15, 84....	15	8	760000
Silver King Mining Co., Arizona.....	5 00	500000	100000	100	10000000					Dec. 15, 83....	25	43	1300000
Standard Con. Mining Co., California.....	1 00	100000	100000	100	10000000					March 12, 84....	25	80	4450000
‡Silver Cord Silver M. Co., Colorado.....	80	400000	500000	10	5000000					Nov. 1, 83....	10	3	225000
St. Joseph Lead Co., Missouri.....			100000	10	1000000					Dec. 20, 82....	20	22	390000
Smuggler Con. M. Co., Colorado.....			60000							August, 83....	20	10	66700
Small Hopes Mining Co., Col.....			250000	20	5000000					June 19, 84....	30	6	262500
Syndicate Mining Co., Cal.....			100000	100	10000000					June 5, 84....	10	4	40000
United Gregory M. Co., Gilpin Co., Col.....			300000	1	300000					April 1, 83....	04	3	38250
United Verde Mining Co., Arizona.....			300000							March 10, 84....	20	2	97500

*Shares not in market. †Latest London quotations. ‡Price bid. §The Deadwood has previously paid \$275,000 in eleven dividends, and the Terra \$75,000. ||Only paid on 450,000 shares. ¶This company as the Western up to Dec. 10, 1881, paid \$1,475,000.

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**NOTICE TO CONTRACTORS.**

SEALED TENDERS, addressed to the undersigned, and endorsed "Tender for Coal, Public Buildings," will be received until MONDAY, 21st JULY next, for Coal supply, for all or any of the Dominion Public Buildings.

Specification, form of tender and all necessary information can be obtained at this Department on and after the 24th instant. Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque, made payable to the order of the Honorable the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party decline to enter into a contract when called upon to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

By order

F. H. ENNIS

Secretary.

Department of Public Works,
Ottawa, 21st June, 1884.

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**NOTICE.**

TENDERS will be received by the undersigned, until Friday, 1st August prox., from parties desirous of leasing the privilege of ferrying across the river Ottawa between the Township of Clarence, in the Province of Ontario, Dominion of Canada, and Thurso, in the Province of Quebec, Dominion of Canada, in accordance with the terms and under the conditions set forth in the Regulations—copies of which can be procured at the Department of Inland Revenue, Ottawa, or from the Collector of Inland Revenue at Ottawa.

Each tender must state the amount which the party tendering is willing to pay per annum for the privilege referred to, which amount will be payable in advance, the terms of the lease being for five years from the 1st August, 1884.

Each tender must be accompanied by a cheque marked "good" on one of the chartered banks, doing business at Ottawa, for one-half the amount of the per annum tender. This amount will be credited on account of the first year's rent in the case of the accepted tender, and all other cheques will be returned except in the event of withdrawals, in which cases no refunds will be made.

All communications must be addressed to the undersigned and endorsed on the envelope "Tender for the Thurso and Clarence Ferry."

E. MALL,

Commissioner of Inland Revenue.

Department of Inland Revenue,
Ottawa, July 11th, 1884.

THE MINING REVIEW,

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**ADVERTISEMENT.**

TENDERS will be received by the undersigned up to the hour of 12 o'clock noon on FRIDAY, the 14th day of July next, for the purchase of what is known as the

Pincher Creek Indian Supply Farm

situated some 39 miles south-west of Fort McLeod, in the district of Alberta, North-West Territories, containing about 3,000 acres. The farm has been occupied and cultivated by the Indian Department as a supply farm for the Piegan Indian Reserve, and will be sold in one block, with the improvements thereof.

During the past year it was leased by the Halifax Ranching Company. The soil is described by the surveyor who laid out the farm as being of superior quality, the herbage rich, and the water abundant and good.

The grain crops upon the farm are stated by the farmer of the Indian Department in charge, to have been excellent and to have ripened well.

There are upon the land a dwelling-house, granary, blacksmith's shop, cattle and hay corrals, sheds, barbed wire fence enclosing fifty acres, a deep well, and the land is partially drained.

Payment will be required to be made one-fourth in cash, and the remainder in three equal annual instalments with interest upon the unpaid balances at the rate of six per cent. per annum.

Each tender must state clearly the amount per acre offered, and must be accompanied by a cheque marked good by one of the chartered banks of Canada for 10 per cent. of the total amount of the price offered, the difference between 10 per cent. of the purchase money and the first instalment of one-fourth to be paid to the credit of the Minister of the Interior, on or before the 15th day of September next.

The lowest or any tender not necessarily accepted.

A. M. BURGESS,
Deputy of the Minister of the Interior
Department of the Interior,
Ottawa, 6th May, 1884.

**MAIL CONTRACT.**

SEALED TENDERS, addressed to the Postmaster-General, will be received at Ottawa until noon, on Friday, 29th August, 1884, for the conveyance of Her Majesty's Mails, on a proposed Contract for four years, three times per week each way, between Dunrobin and South March from the 1st October next.

The conveyance to be made on horseback or in a suitable vehicle, via the Postoffice at Dunrobin when going, and by the direct route when returning. The mails leave South March every Tuesday, Thursday and Saturday as soon as possible after arrival of mail from Ottawa, and to perform the journey to March and back within three and three-quarter hours.

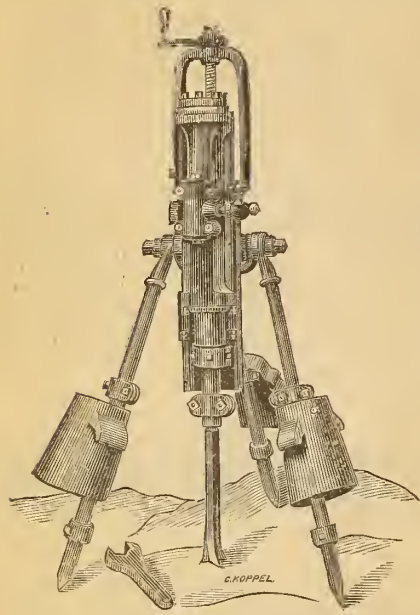
Printed notices containing further information as to the conditions of proposed contract may be seen, and blank forms of tender may be obtained at the Postoffices of Dunrobin, March and South March, or at the office of the subscriber.

J. P. FRENCH,

P. O. Inspector.

Postoffice Inspector's Office,
Ottawa, July 26th, 1884.

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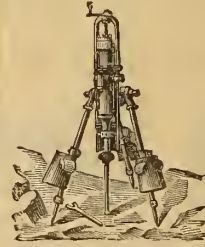
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S $\frac{1}{2}$ and N. E $\frac{1}{4}$	15	16	23	480	
E $\frac{1}{2}$ of N. W $\frac{1}{4}$	15	16	23	80	
	S $\frac{1}{2}$	3	17	23	320
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MINING REVIEW

VOL. 2.—No. 8.

1884—OTTAWA, AUGUST—1884

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UNION CHAMBERS, 14 Metcalfe Street.

The CANADIAN MINING REVIEW is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts as well as others interested in Canadian Mineral Lands are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 5th of the month it is to appear.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

Much has been accomplished during the past two years towards developing the mining industries of Canada. From ocean to ocean prospectors have been busy, and they have not laboured in vain. Rich deposits of gold, silver, copper, iron, coal, mica, phosphate and asbestos have been discovered, and mines of all these minerals are now being vigorously and profitably worked. Gold mining in Nova Scotia is now on a paying basis, and it is expected that the mines of British Columbia will return a larger profit during the present year than they have done for some years past. In Beauce, Province of Quebec, gold mining is paying

handsomely, and new ground is being opened that is pronounced very rich. At the Lake of the Woods, gold mines have been opened within the past two years of which most favourable reports have been made as to the richness of the quartz, but unfortunately lack of capital has retarded operations at some of the most valuable locations in this district. Important discoveries of silver have been made by the Silver Islet Company on their property on the north shore of Lake Superior, which will, in all probability, lead to the resumption of active operations by this company at an early date. Further inland, in a north-westerly direction, the developments at the Rabbit Mountain and Huronian mines have proved that region to be rich in silver; and, in fact, it would be difficult to name any silver mine in America that produces ore carrying a larger percentage of precious metal than either of these mines. Mica mining in Eastern Ontario has become a steady industry, and is rapidly increasing in importance, and in Villeneuve Township, County of Ottawa, a mine of this mineral has been opened that promises to become an abundant producer of mica equal in quality to the product of the New Hampshire and North Carolina mines. A large amount of asbestos, of superior quality, is being profitably mined in the Eastern Townships by Canadian and American mine owners. In Central Ontario some of the iron mines have been vigorously worked during the past year, and heavy shipments of the ore are now being made over the Central Ontario Railway to Weller's Bay, on Lake Ontario, from

which point it will be forwarded to Cleveland. At the phosphate mines in Ottawa County there is probably more activity than in any mining district in the Dominion. This industry has become one of great importance in the country, though it may be said to be yet in its infancy, and the annual output of the mines is steadily increasing. The mines are capable of yielding a much larger output, which fact is now being demonstrated by the introduction of steam drills and other machinery. Mining in Canada is making steady progress.

Referring to the discovery at Silver Islet, the Thunder Bay *Sentinel* remarks: "While not wishing to cause any undue excitement in the matter, we can hardly refrain from regarding the discovery of silver at Silver Islet on the mainland as a very important event. The nature of the surface ore taken out at present is of precisely the same character as that originally found upon the Islet, and it is to be hoped that the labours of the men now employed in making further investigations will bring results similar to those which induced the owners of the mine there (now closed) to sink so many thousands of dollars in developing it. Should further investigation justify the company in sinking a shaft and working it, the operations would, of course, be carried on at a much less expense than was the case at the Islet mine. The latter being entirely under water, considerable expense and trouble was always more or less a drawback to the success of the work, and had the vein not been of a

singularly rich nature this fact alone would long since have caused the owners to abandon it."

British Association.

The programme of the Citizens' Committee for the reception of the members of the British Association for the Advancement of Science visiting Ottawa on Saturday, 30th August, will be as follows:—

Upon the arrival of the visitors there will be an informal reception at the railway station. Carriages will be in readiness to convey the party to the Drill Hall, Cartier Square, where an address will be presented to the visiting members and a reception will be tendered them by the citizens. The party will afterwards be driven to the Russell, where luncheon will be served at one o'clock. After luncheon the visitors will be shown through the Houses of Parliament, the Library of Parliament, the Departmental buildings, the Geological Museum, the National Art Gallery, etc. The party will then be driven through the Major's Hill Park, Government House Grounds, thence to the Waterworks, the Timber Slides, the Chaudiere Falls and the Sawmills. Factories and other places of interest will also be visited if time permits. The visitors will be driven to the railway station in time for the departure of the train.

It is not improbable that a number of the members of the Association will visit the Phosphate mines in the vicinity of Buckingham, but it will be necessary to consult individual members, after their arrival at Ottawa, before any definite arrangements can be made with this object in view. Such an addition to the programme is most desirable and it is to be hoped the committee will succeed in carrying it out.

CANADA'S PHOSPHATE TRADE.

Phosphate mining in the County of Ottawa assumes larger proportions month by month. The mines, during the past year, have developed so satisfactorily that their owners have been encouraged to introduce machinery

and to thus adopt a new system of mining. The force of miners employed at the present time is greater than at any earlier period since this industry was started, the mines are much more productive, the output is more economically handled, facilities for transporting the ore have been greatly increased, freights to Montreal have been reduced and the importance of shipping the mineral in a high state of purity is now well understood by the mine owners. Since the opening of navigation this year, phosphate shippers have been particularly favoured by low freights to British and European ports, and already a large amount of ore has gone forward. In Montreal, at the various shipping points along the line of the Canadian Pacific Railway, and at the mines, there is a large quantity awaiting transportation, and the amount is being daily added to.

A number of prospectors have been out during the summer exploring the phosphate bearing district, and important discoveries have been made. Many of the recently discovered deposits have been partially opened up for the purpose of testing the properties preparatory to mining operations being engaged in on a permanent basis, and by next season some of these locations will, no doubt, yield abundantly and help to swell the annual output of the county. At the beginning of the year we predicted that about twenty-three thousand tons would probably be the total amount of phosphate to go forward before the close of navigation. The shipments will certainly aggregate 23,000 tons from the Ottawa district alone. This will be in excess of former shipments made in any one year from all the Canadian mines combined, and the quality of this year's output is of a higher grade than any that has ever before been shipped.

THE MINES.

High Rock Mine.—Of the mines in the Rivière du Lièvre district this one has been worked more steadily and has produced more phosphate than any other now in operation. For some years past the annual output has been increasing and this season the owners expect to forward not less than 6,500 tons. The daily yield of this mine has been increased by the introduction of steam power and the adoption of an entirely new system of mining. Steam drills and hoists are now in use where hand power alone had been employed; new

ground has been broken during the summer, which promises to lead to rich deposits; the force employed is greater than ever before, numbering 110 men, and the daily output averages about 30 tons.

Star Hill Mine.—Work was first started on this property by the Union Phosphate Mining and Land Company in May of last year, and for some months afterwards the attention of the company was directed chiefly to the erection of buildings and machinery, the opening of roads and in making other necessary preparations for permanent work. All this was thoroughly done, and mining operations have since been conducted on businesslike principles. A very small portion of this company's territory has yet been opened up, and, to judge from the appearance of present developments, it is not likely that it will be found necessary to break new ground for some time to come. The openings that are now being worked are yielding abundantly, and the amount of phosphate that will have been shipped from this mine during the present season will aggregate about 6,000 tons, a portion of which was mined last year but not forwarded. This, in addition to the erection of buildings, the construction of a tramway and other improvements on the property, and taking into consideration the fact that the company broke ground but a little more than a year ago, is certainly a most satisfactory showing and speaks well for the future of *Star Hill*. This mine gives employment to an average force of 80 men.

North Star Mine.—The result of the past year's operations at this mine has been most satisfactory to its owners, the Dominion Phosphate Company, who have saved no expense in thoroughly equipping the property and opening the mine in such a manner as to admit of permanent operations being carried on to best advantage. The force employed at present averages forty men, and the daily output varies from 10 to 12 tons. The product of this mine has the reputation of being of a very high grade not excelled by that of any other phosphate mine in the country. This company has 30 men employed at its "Washington" mine, and work is progressing very satisfactorily. The mine is developing into a valuable property.

Little Rapids Mine.—During the past two months a steady improvement has been noticeable in the principal shaft, and some new ground has quite recently been opened, exposing an extensive deposit of mineral. In the shaft the body of ore continues to increase in size, and in the drifts the men are working in solid mineral. The phosphate that is being raised from this mine is quite equal to that of the *North Star* if not of a higher grade.

Emerald Mine.—From the main body of ore at this mine the output is now being handled at a much reduced cost to formerly. Hoisting has been dispensed with, and both the mineral and refuse are now run out on a tramway through a tunnel. Everything connected with the management of the Ottawa Phosphate Company's mining operations is being thoroughly systematized with a view to raising and handling the product of this valuable mine at a minimum of cost. The body of mineral now exposed on the property is enormous and apparently inexhaustible. The average force of men employed does not exceed 65, and during the month of July the output was upwards of 600 tons of high grade phosphate, dressed and deposited in the ore bins. The company proposes extending operations, and is now making preparations for the accommodation of a larger number of miners. A new boarding house is in course of erection capable of sitting one hundred men in the dining room, and additions will be made to the other buildings on the property. The shipments from this mine for this season will aggregate about 5,000 tons.

Numerable less important mines than those mentioned are being worked in the Du Lièvre district, and are contributing largely to the general output. The mineral that has been forwarded from these mines is of a very fair quality and gives evidence of careful clobbering.

The Lièvre River Phosphate and Land Company, incorporated on the 4th July of this year, has already begun operations on some of its property, and we understand that good results have been attained. We are not in possession of any particulars of this company's operations to date, but hope to be informed in time for our next issue.

McLaurin Mine, in the Township of Templeton, continues to be as productive as at any time since the mine was opened and the mineral at the present level appears to be of a more solid character than it was nearer the surface. The force employed on this property is not so large as at the other important mines to which reference has been made, but the deposit is very productive and the mineral raised is of a very high grade. This year's shipments have amounted to about 2,500 tons, and the number of men employed averages 30 to 35.

The Gemmill Mine, in Wakefield Township, has produced more phosphate this season than last, and some new openings that have been made give promise of yielding large quantities of high grade ore, in fact the mineral that has been shipped from this property during the past five or six years has invariably assayed, in cargo lots, above 82 per cent.

The total amount of Phosphate forwarded from the mines in the Rivière du Lièvre district since the close of navigation of 1883 has amounted to 16,590 tons. About 75 tons are now being forwarded daily to the C.P.R. station at Buckingham and to the shipping point on the Ottawa river.

Phosphate Quotations.

Latest advices from Liverpool, London and Glasgow report Canadian Phosphate firm at 1s. 1½d. per unit for 75 per cent., with a fifth of a penny rise. Sales have been made at this price during the month of lots consigned early in the season when freights were low and returns have been satisfactory, showing the shipments to have run 82 per cent. and higher.

FREIGHTS.

Although rates are much higher than at the opening of navigation, a fair amount of tonnage is offering at reasonable rates. To Liverpool, London or Glasgow, sailing vessels are carrying phosphate at 6s. to 7s. 6d., and steamers at 10s. per ton. A quantity has recently gone forward at these figures.

MICA IN CANADA.

Until within the past two or three years it had been thought that mica, of good quality, did not occur in economic quantity in Canada, but the constantly increasing demand for it has encouraged prospectors to search diligently, and the result has been the discovery, in many localities, of deposits that are capable of producing this mineral not only in large quantities, and in plates, or sheets, of merchantable size, but equal in quality to that found in any part of the world. In the United States it has been found in some of the Western Territories, though not of a high grade in its colour or transparency, and it occurs more or less in some of the Atlantic States. In Maine and New Mexico, a small quantity has been mined, while New Hampshire and the State of North Carolina have been the principal sources of supply for the American and Canadian markets for many years past. The best quality of mica that has yet been produced in America comes from New Hampshire, while a much larger quantity has been mined in North Carolina, and an excellent quality. A great variety of mica is known to occur in various parts of Canada, and for some years past a fair quantity, of a second or third quality, has been mined and sold to stove manufacturers and dealers to be used chiefly in repurging. At Sydenham, to the North of Kingston, a mine is being vigorously worked, and is producing an enormous quantity of amber, or wine coloured, mica which finds a ready sale both in Canada and in the

United States' market. The product of this mine is very large and the deposit is said to be capable of yielding an unlimited output for some time to come. Mr. W. E. Brown, of Ottawa, recently purchased a mica mine in the Township of Palmerston from Mr. Wm. Sheppard, of Aylmer. Specimens that we have seen from this mine are of a very excellent quality, but the work that has been done on the property, up to the present time, has been insufficient to prove the nature of the deposit or its productiveness.

In the Nipissing district, and at Mattawa, mica occurs of a very good quality, and, though no development work has yet been done in either of these localities, we have seen crystals, of many pounds in weight, capable of producing sheets of clear, white mica in sizes varying from $2\frac{1}{2} \times 5$ to 3×6 inches. In the Township of North Burgess, the *Pike Lake* mine has been very productive, having furnished many thousand pounds of white mica of excellent quality, and in sheets of unusually large sizes. There are several openings on this property, the deepest of which is but forty feet, and in each of them large bodies of crystals are exposed. Some of the crystals found in these openings have yielded, individually, upwards of 1,000 pounds of mica, cut and dressed, ready for shipping. On the bleak shores of Labrador, a fine quality of mica occurs, and a deposit is about to be tested at Chateau for the purpose of ascertaining if it can be obtained in sufficiently large crystals to render it of commercial value. The most important discovery yet made in Canada is the *Villeneuve* deposit, in the County of Ottawa. The crystals are well formed and very numerous and the mica is of a quality unexcelled in any part of the world. The micaceous vein extends for upwards of 300 feet in length and has a width of about 80 feet exposed. During the past two months Mr. W. A. Allan, of Ottawa, has had a small force of men at work on the property and, although more attention has been given to erecting buildings than to actual mining, a quantity, several thousand pounds, of magnificent mica has been taken out. The small amount of work that has been done on the surface has exposed upwards of one hundred well formed crystals embedded in quartz and feldspar gangue. A short tunnel has been driven from the base of the hill towards the vein, and the body of mica has been reached at this level, which shows that the crystals improve in size and compactness as depth is attained. From some of the crystals taken from the end of the tunnel, sheets of perfect mica measuring as large as 6×9 inches, and in quality equal to any that has been produced from the New Hampshire or North Carolina mines, have been received at this office. This is, without doubt, the most important and the most

valuable discovery of mica in Canada, and the deposit is capable of yielding a large annual output.

Gold Mining in Beauce.

The latest advices received from the *Allan & Humphrey* mine in St. George Concession are most satisfactory so far as they relate to the working in the shaft, but we regret to learn that, owing to the continuance of dry weather, the water fell so low in Slate Creek that the sluices which had been constructed have had to be extended for a distance of half a mile so as to catch a sufficient supply of water for washing. This has caused some delay and we are not yet, therefore, in a position to give our readers the result of the first wash up, as promised in last month's issue. The ground that is now being raised from the shaft is richer than any that has been met with, both in fine and coarse gold. This property is turning out a genuine *bonanza* and its owners are jubilant over their prospects. Their success will no doubt be the means of attracting a large number of miners and speculators to the district, and the ground along State Creek is likely to prove as rich in gold as that of any other gold producing region in America.

We are indebted to Dr. Reed, who has given much attention to mining in the Eastern Townships, for the following facts relating to gold mining in the County of Beauce: "Gold has been found in the Famine River from its mouth to above the great falls in the Township of Watford. Nuggets, four ounces in weight were found in 1865, and desultory mining in the bed of the river has always yielded good pay. Many large quartz veins traverse the river bed, but there has, as yet, been no practical mining engaged in. Sir William Logan, in the Geology of Canada, 1863, refers particularly to the alluvial gold in the Famine. The recent discoveries by the St. Onges, now the *Humphrey & Allan* mine, about thirty arpents from the Famine, on Slate Creek, are the result of practical workings by experienced men, backed by capital, and show conclusively that the reports of the late eminent geologist are correct, and that gold is to be found in the alluvions and banks of the river as well as in the river bed.

The Dominion Government having voted \$3,200 a mile to the Quebec Central Railway, from Beauce Junction to the Province Line, it is expected that the road will be ready for traffic this fall to the Famine River, nine miles from its present terminus in St. Francis. This will give increased facilities to gold mining in the district."

Central Ontario Mines.

(Special to the Review.)

At the *Coe Hill* iron mine, in Wallaston, work is being pushed vigorously and in a more systematic and mining-like manner than at any time since the mine was opened. Three shafts, with their respective wings, are being sunk and an average depth of 50 feet has already been reached. When this mine gets into thorough working order the owners will ship about 400 tons of ore daily. At present the daily shipments amount to about 300 tons, a portion of which is being taken from the stock pile, the balance being the daily output of the shafts. Powerful hoisting machinery is in course of erection on this property, and whilst excavating for the foundation on which the machinery will stand another large vein of iron was uncovered, about one hundred and fifty feet to the north of the main vein and running parallel with it. A theory has been advanced by a local geologist of an anticlinal axis making it but one vein with different dips, the main, or first discovered vein, dipping to the south with this newly discovered vein dipping to the north, but no work has yet been done whereby the correctness of this theory could be proved, and there are people who do not believe in anticlinals in a granite formation. Several new buildings are in course of construction at the *Coe Hill* mine and contracts have been given out for the erection of sixteen dwelling houses for the accommodation of the workmen.

The *Nugent* mine, situated about two miles to the west of *Coe Hill*, is now being thoroughly prospected. A vein of ore has been discovered that runs the full length of the lot. This property is owned by Messrs. Brown & Gaujot.

The *Baker* mine, in Limerick, is now being prospected with a Diamond drill.

At the *Arthur* mine, in Chandos, mining operations had been suspended for the purpose of testing the property with a Diamond drill. The tests, it is to be presumed, have resulted satisfactory as the mining has since been let to some American contractors.

The last two mentioned mines are owned by the Central Ontario Railway Company.

In the Madoc district there is no iron mining at present, but the water is now being pumped from the Walbridge Hematite mine and other preparations are being made for the immediate resumption of active mining operations.

At the *Canada Consolidated* gold mine, in Hastings County, a new revolving roasting furnace is nearly completed, and the owners of the mine are sanguine of favourable results. Other gold mines in Madoc, Marmora and Kaladar are now attracting the attention of capitalists, and the old *Richardson* mine is

likely to come to the front again. The chancery suit which has long since hindered mining operations on the last mentioned property has been finally disposed of and the owners, Messrs. Kelso & Brown, are now free to resume work.

Bessemer Steel.

The production of Bessemer Steel for the year 1883 was divided between the several steel countries as follows: Great Britain, 1,553,380 tons; United States, 1,119,576 tons; Germany, 995,000 tons; France, 440,000 tons; Russia, 340,000; Belgium, 220,000; Austria, 175,000 tons, and Sweden, 50,000 tons, making in all 4,892,956 tons.

Lake Superior Silver Mines

THE "HURONIAN" YIELDING ABUNDANCE OF RICH ORE.

Satisfactory Work at the "Rabbit Mountain."

Important Developments by the St. Paul Mining Company.

Specimens of rich ore have been received at Port Arthur during the month from a new discovery on location 39 T., owned by the St. Paul Mining Company. The specimens were taken from the shaft, at a depth of 68 feet, where several off-shoots are branching from the main vein. The shaft now shows large quantities of native silver and silver sulphate, and the company looks upon this recently discovered feature as a decided proof of the increasing richness of the mine. There are only twenty men at work at present, but this force is to be much increased as soon as miners can be secured.

The *Rabbit Mountain* mine is developing most satisfactorily, and rich ore is being taken from the new shaft that was started this spring. The ore continues of the same character as at the mouth of the shaft, but appears to carry more silver as lower depth is reached.

The *Huronian* continues to produce abundance of ore, rich in gold and silver, and the pay streak is steadily increasing in width. Systematic mining is carried on by this company, whose property is well equipped with machinery and general mining plant. The mill is kept busily employed, and the ore in the vein continues very rich. Of the actual result of the milling for the past month we are not yet informed. Messrs. C. T. Bate, Hiram Robinson and W. A. Allan, all of Ottawa, with some other shareholders, are now en route to the *Huronian* mine for the purpose of making themselves familiar with a property in which they are personally interested. On their return we hope they will be able to report favourable progress.

MINING IN THE ROCKIES.

(Special to the REVIEW.)

Silver city, which for some time, especially during the past winter, had been the headquarters of miners and prospectors, is now what might be styled, "a deserted village," some members and officials of the Alberta Mining Company being among the very few inhabitants left.

The *Queen of the Hills* mine, where active work was carried on during last winter, has been abandoned, and those who have been induced to invest money in this *quasi* bonanza are reticent as to future movements. The popular opinion is that mining will not be resumed.

Some work has been done at the *Alberta* mine, but being isolated from the line of travel, and so difficult of access at present, few people, apart from those directly interested in the property, have visited this mine during the summer. The ore is said to carry about eight dollars in silver to the ton, and a paying percentage of copper. Mr. O. G. Dennis, who resides at Silver city, is watching the interest of the shareholders and managing the company's affairs. A small force of miners is employed and due caution is being observed in performing the preliminary development work.

There are no other mining ventures in progress on the Eastern Slope of the Rockies, and prospectors have all found their way beyond the summit. There exists no doubt in the minds of people out here, who are capable of judging, that the Pacific side of the Rockies is the mineral bearing region of the North-West Territories, and that little attention will be given by mining men to any point lying to the east of the summit.

Coal in the North-West.

Copies of a pamphlet have been received containing a paper on the geology of the line of the Canadian Pacific Railway read by Dr. Dawson before the Geographical Society, during his recent trip to Europe. Describing a coal-bearing stratum near Medicine Hat, Dr. Dawson stated that about 90 feet from the base of the section is a bed of coal three feet thick, and covered with a shale rock, or parting, of two feet six inches, above which is another stratum of coal, four feet thick, with a shale roof. For about 50 feet above this, the cliff is occupied with shales holding several thin coals, and on this rests another bed of coal 3 feet 10 inches thick, with a roof of shale 3 feet thick, and over this a small coal stratum 10 inches thick. Above this, shales again occur, and, near the top, a bed of ferruginous and pebbly sandstone. The less pure coals in this section are brown coals, composed of leaves and vegetable debris compacted together. The better coals, including

the thicker beds, are apparently composed principally of coniferous wood, having the texture of a bright, hard lignite approaching to the character of true bituminous coal, and affording a valuable fuel. Beds of this character are very extensively distributed over the region. Beds of coal, some of them supposed to overlie those seen at Medicine Hat, occur at Maple Island, Blackfoot Crossing, and elsewhere near the base of the mountains. West of Calgary, as the Cretaceous and Laramie beds enter the Rocky Mountains and approach the junction with the Paleozoic rocks, they become much folded and disturbed, and the coals contained in them become harder and drier in quality, in some places approaching to anthracites.

A Melancholy Accident.

Gold Prospectors Drowned in the Kootenay River.

On the 13th inst., James Bracken, Judson Bartlette and Geo. Dean, a party of gold prospectors, were capsized while attempting to run dangerous rapids in the Kootenay River, British Columbia, near where the stream empties into the Columbia.

Bracken and Bartlette were sucked under and drowned. Dean managed to retain hold of the boat, drifted a long distance in an unconscious condition, and was finally thrown on a pile of drift. The bodies of his companions were not recovered.

The party had been prospecting far up in the mountains, and constructed a small skiff to descend to Kootenay Junction. They had successfully shot a hundred dangerous rapids and had nearly reached their destination when the fatal accident occurred.

The party had been, until recently, in the employ of the Columbia & Kootenay Railroad and Transportation Company in the capacity of surveyors.

A Modern Curiosity.

The *Florence (Arizona) Enterprise* says: "An Indian recently came to a couple of gentlemen there and said he knew where there was a gold mine in a cave, and that he would go and bring them some of the ore if they would outfit him. They did so, and after being gone two weeks he returned, bringing with him a piece of black oxide of copper as large as a tea cup. The rock contains a large cavity lined with water crystals studded with shot gold. The crystals are a beautiful sky-blue, and make a handsome setting for the gold. The specimen is as rare as it is beautiful, and if the Indian does not exaggerate, this cave is the greatest curiosity of modern times."

Gold Mining as an Investment.

(By Thomas Cornish, M.E., to the London M. Journal.)

Our gold supply in the future, as in the past thirty years, must be dependent on the results of gold mining as a profitable industry, and it may not be uninteresting to draw attention to the question of gold mining as an investment, or the means by which the gold supply can be permanently and profitably maintained. Gold mining must be classed as one of the most important industries of the present day. The industry is based upon such reliable facts, and built on so solid a foundation, that its importance cannot be denied.

The addition to the world's wealth through the enterprise of the gold miners of America and Australasia since the discoveries of gold in those countries in 1849 and 1851 has been nearly £800,000,000 sterling in gold and nearly half that amount in silver, or upwards of £1,110,000,000 sterling in gold and silver. This vast, real and solid wealth has been raised by a comparatively small section of the community, and distributed throughout the channels of finance, trade, commerce and industries, to the benefit of all who came within its widespread influences.

Our gold supply may be termed a true barometer of the prosperity of the countries in which it is being produced or in which it becomes absorbed by the current of trade and commerce. As population increases, trade, commerce and industries expand; so it is necessary, for financial purposes, that a proportionate supply of gold should be produced to meet the increasing demands.

Gold mining as an investment, where the operations are conducted economically under the control of practical men, has in the past and is now at the present time proving itself the most profitable of any. It is not of the visionary or shallow character that many of the people in Great Britain are led to believe it to be, in consequence of the disastrous failures of the many companies lately formed with the ostensible object of gold mining in India and Africa, through mismanagement and want of practical experience in directing the financial and mining operations.

It is not possible to obtain the returns of the profits made in gold mining generally, but they may be approximately estimated at from 25 to 50 per cent. on the output where the operations have been conducted without waste of labour; but the absolute results of some of the mines now in operation in America and Australia may be taken as a fair criterion of what can be and is being accomplished under efficient local management.

The yield of gold in the colony of Victoria has been about £205,000,000 sterling since 1851, and as one-half of the amount was raised during the first ten years, the profits might be fairly taken during that period at nearly half of the amount raised, while during the latter period the profits might be estimated at from one-fourth to one-third the product, or in round figures, say, from £50,000,000 to £60,000,000 may be estimated as profits on labour and capital judiciously invested in gold mining in that colony.

In the year 1882 the yield of gold was given as 889,535 ounces at £4 per ounce, equal to about £3,594,140; dividends from public gold mining companies amounted to nearly £800,000, or about double that of all the dividends from banks, insurance and other public companies in the colony, while a number of mines are held by private owners, where the dividends are not made public, would probably bring the amount of dividends from gold mining in Victoria to nearly £1,000,000 sterling for the year.

As a further proof of profitable gold mining in that colony. I enclose you a list of twenty-one gold mines whose dividends have not been less than £50,000 in any case, which in the aggregate have amounted to about £6,000,000, while a large number of very profitable mines are on the list of dividend-paying mines under the amount of £50,000.

While a list of forty gold and silver mines in America, whose dividends also exceed £50,000, amounts in the aggregate to nearly £10,000,000 sterling.

The following are the yields and dividends from the six principal alluvial gold mines in the Creswick division of the Ballarat district, Victoria, for three months ending June 30, 1883:

Name of Company.	Yield.		Dividends and Royalty.
	ozs.	dwt.	
Ristori	5,540	5	£17,022 8s 6d
Madame Berry ..	7,067	18	20,221 10 0
Lone Hand	4,357	11	6,484 1 0
Loughlin	1,621	3	1,702 17 6
Dyke's Freehold ..	1,360	0	2,222 0 6
New Australasian ..	4,008	19	3,750 0 0
Total	23,955	16	£51,402 17 6
	£95,823	4	

The above returns show the profitable nature of gold mining where there is a good supply of wash-dirt, and the water not too heavy, and as two of the companies are only lately in gold, their profit will increase as the ground gets more fully opened out. The first two companies have

been working in wash-dirt for some few years, have their mines well opened up, and may be deemed good examples of practical and profitable mining management of the Ballarat system. The Ristori Company, with an original capital of £12,000 has already paid in dividends and royalty over £100,000, and, as shown by the quarter's returns, June 30, 1883, on a yield of 5,540 ounces 5 dwts. gold, equal to £22,160, paid in dividends and royalty £17,022 8s. 6d., or nearly 75 per cent. on the output of gold has been profit; or showing an annual interest on the original capital at the rate of 700 per cent. per annum. Some of the quartz mining companies have been even more successful, paying dividends to the extent of from £250,000 to £800,000 on small capitals from £12,000 to £37,000, while the list under those sums is a very long and respectable one.

Gold mining is a business that to be made successful, must be managed by practical men who have had opportunities of gaining experience in the various phases of the industry at the mines. The results of the late furore in the so-called attempts at gold mining in India and Africa have resulted in a miserable fiasco, as was only to be expected from the manner in which the business and mining operations were conducted.

I have occasionally drawn attention to the deplorable waste of capital and labour in gold mining through the assumption of knowledge by amateurs who imagine themselves competent to advise on the investment of capital in gold mining or the management of mines. Their excited and fanciful imaginations lead them and their friends who are foolish enough to be guided by their judgment into error and serious losses, for which the mining industry gets blamed instead of the reckless indiscretion of the adviser and advised.

What are termed losses in gold mining are more imaginary than real. Speculation in high-priced or inflated stock above legitimate value of a mine must, as a natural consequence, end in loss. So also with mines under defective management and extravagant expenditure in paying for the privileges of prospecting for gold. They also will surely come to grief.

The value of a gold mining property may be appraised by competent authorities in such a manner as to prevent any great loss on the investment, although no set rule can be laid down to guide men's judgment as to their estimate. It is questionable whether any gold mine should ever be valued at more than from two to five years' purchase, thus taking a mine well developed and paying good average dividends, according to the nature of the matrix operated on; for the mine to be worth a three years' purchase it is necessary that there should not be less than five years' work fairly in sight of a similar quality ore, or the lodes so opened that it affords a fair presumption that such a quantity of matrix can be obtained.

Mines vary so much at times in value and yield that the investor has a right to the chances of improved prospects as may arise, just as he is liable to the reverse by loss. Some of the considerations that should guide the investor in gold mines are, good climate, stable government, liberal laws, accessibility, ample supply of water and wood, and last but not least, the prospects of a fair quantity and quality of matrix to operate on. With these considerations, under careful management, gold mining is at the present, as in the past, proving itself to be the most profitable industry in the world.

The fields for legitimate and profitable investment in gold mining are, practically speaking, inexhaustible and afford ample scope for enterprise, and by judicious investment of capital under experienced direction, there need be little fear of loss, while the profits are likely to be large, as the gold supply can be materially increased by the development of the resources at hand.

Product of the Mines of New South Wales during 1883.

According to the official report of the Under-Secretary for Mines of New South Wales for 1883, the result of all the mining operations in the Colony during the year was as follows:—

	1882.	1883.
Gold, ounces.....	140,469	123,806
Silver ".....	38,618	77,066
Coal tons.....	2,109,282	2,521,457
Shale ".....	48,065	49,250
Tin ".....	8,669	9,125
Copper ".....	4,958	8,957
Iron ".....	7,476	3,434
Antimony ".....	1,068	375
Lead ".....	11	30
Asbestos ".....	7	..
Bismuth ".....	2 14	3.7

The falling off in the gold production has been great as compared with the yield in former years, as the following table shows:

PRODUCTION OF GOLD.

	Ounces.		Ounces.
1874.....	270,823	1879.....	109,650
1875.....	230,883	1880.....	118,690
1876.....	167,412	1881.....	149,627
1877.....	124,111	1882.....	140,469
1878.....	119,665	1883.....	123,806

On the subject of gold the Under-Secretary states: "It is clear that the continued drought has had the effect of preventing the prosecution of prospecting operations during the year, and has seriously retarded the working of older fields. Whether the falling off in the yield of gold can be accounted for by the absence of sufficient water to carry on the usual crushing and washing operations, or whether the decline is not in some degree due to the gradual exhaustion of such of the deposits in the older gold-fields as are capable of being profitably worked without the aid of steam, hydraulic, or other power, it is difficult to determine with any degree of certainty. It is quite certain that in the absence of new discoveries it is only a question of time, and that comparatively limited, before those deposits which can be worked by the individual miner must be exhausted; but with the breaking up of the drought, we may reasonably expect that prospecting operations will be resumed and new ground opened. Of course, there is an unlimited extent of auriferous country within the older gold-fields of this colony, which, worked with proper appliances on a large scale, would yield satisfactory profits and give steady employment to a large body of miners for many years to come. But until the necessary capital and skill is brought to bear on these deposits, or some new discoveries be made, we cannot hope to see any large increase upon our output."

THE WORLD'S GOLD PRODUCTION.

It has been shown by several writers, says *Chamber's Journal*, that up to the year 1848 the world had outgrown its supplies of precious metals, and that commerce was languishing for the want of the wherewithal to adjust the exchanges of communities. Previous to that year, the principal sources of supply were South America, the west coast of Africa, Russia in Europe and Asia, and the island of the Malay Archipelago. According to the calculations of M. Chevalier, the total production of both gold and silver from these sources, between 1492 and 1848, was equal in value to £1,740,000,000. The importation of gold, however, was small; and the total stock of the metal in Christendom in 1848 is estimated to have been only £560,000,000. The production since that time has been very remarkable. Let us look at the figures. In 1848 California gold began to come forward; in 1851 the Australian fields were opened. Between 1849 and 1875 the production of the world is estimated at £616,000,000, so that in twenty-seven years the stock of gold was more than doubled. The average annual supply previous to 1848 was £8,000,000; in 1852 the production was £36,500,000. An Australian authority estimates the yield of the colonies from 1851 to 1881 as £277,900,000; as Mr. Hogarth Paterson gives the total production of the world between 1849 and 1880 as £710,000,000.

The statisticians of the United States mint estimate that the total production of gold in the world during the 400 years ending in 1882 was 10,394 tons, equal in value £1,442,359,572. During the same period the production of silver was 101,731 tons, of the value of £1,716,463,795. On the basis of the last three years, the average annual production of gold in the world is now £21,500,000. Taking 1881 as an illustration, the largest contributors were:

United States.....	£6,940,000
Australasia.....	6,225,000
Russia.....	5,710,000
Mexico.....	197,000
Germany.....	48,200
Chili.....	25,750
Columbia.....	800,000
Austria.....	248,000
Venezuela.....	455,000
Canada.....	310,000

LAKE SUPERIOR GOLD.

The *Economist*, N.Y., August 16th, contains the following: "Among the rich mining industries of the Lake Superior peninsula, a new one promises to come in. Three years ago Postmaster Ropes, of Ishpenning, was prospecting in an unused marble quarry about four miles north of the town. Mr. Ropes added to his duties as postmaster the business of assaying, so that he was an expert. While he was putting in his pick here and there he struck gold-bearing quartz. Subsequent examinations revealed the mother vein, and the result was the formation of a company, to which was sold the option, which expires the 1st

of November, of taking the property. The company pays \$6,000 for the privilege of working the mine till November, and it is thought that the results obtained establish the fact that the Marquette district possesses a profitable gold mine. A shaft has been sunk and a fine stamp mill erected for the purpose of experimenting with the ore, which is obtained in sufficient quantities to keep busy a mill five times as large as the present one. The Colorado expert who is superintendent of the mill thinks that the ore can be mined at a cost of \$3 a ton. The ore obtained from the shaft which has been struck yields, on an average, from \$6 to \$9 a ton in gold, and from \$2 to \$3 in silver. Some ore has been taken out which yields as much as \$300 a ton."

MINING STOCKS.

New York Mining Stock Markets.

Except for one or two stocks, the activity developed towards the close of the week ending August 16th has not since then been maintained, and while a fair amount of trading has transpired the market cannot in any sense be described as active, still a very steady tone has prevailed, and in several instances a higher range of prices has been established. Beyond these features, however, the dealings have not presented any points of special interest. The outside public still refuses to speculate in mining stocks but regular traders are evidently more inclined to operate and it would seem as though the general improvement gradually developing in railroad securities, as well as in commercial affairs, was in some degree being reflected in the mining stock market and that a more hopeful as well as cheerful feeling was slowly extending its influence. The stocks most actively dealt in upon this market certainly appear to have worked up to a higher plane of values compared with the lowest point touched during the recent depression, and to have maintained the advantage in consequence of a strong undertone that still prevails, and this is by far the most satisfactory as well as substantial kind of advance that could be experienced. No more booms either in mining stocks or any other department of business activity are wanted just at present; business men have had enough of the last picnic to last them for some time to come and do not care to repeat the experience right away, but what is wanted is a healthy spirit of speculative activity and a moderate advance in the price of many good mining stocks that on their merits are now considered abnormally low. It cannot be denied that among the stocks regularly dealt in, both here and in San Francisco, a good deal of chaff exists, but it is likewise true that among this chaff there is more or less sound grain, consisting of mining properties that are being successfully and profitably worked and that are returning handsome dividends to their owners. This week no less than three announcements of this character have been made; Ontario, Homestake, and Father de Smet, each making a return to their shareholders, the first two companies having already paid in dividends the large sum of over eight millions of dollars. These are by no means isolated cases, as our readers are well aware, but at the moment they serve to bear out the truth of the above remarks.

The most prominent features of the market this week have been Consolidated Virginia and one or two of the Tuscorora group. With respect to the first, the dealings have been large at steadily advancing prices, which singularly enough have been kept considerably above the parity of San Francisco. For this reason the firmness of this stock has been a puzzle to many, especially as nothing has transpired at the mine so far as the public are advised, to warrant an advance. Nevertheless, there have been steady buyers and in all about 15,606 shares have been traded in at from 33 which was the lowest point on Saturday last up to 47, the closing figures yesterday being 42. Other Comstocks have not received much attention, but Sutro Tunnel has ruled moderately active and firm, about 5,700 shares selling at 17 up to 21. Small sales of Sierra Nevada have transpired at 1.70 to 1.75 and then down to 1.50 in sympathy with a similar drop at San Francisco; and occasional transaction in California at 17 completes the list.

The Tuscorora group have ruled firm, and although but a moderate business has been accomplished prices show quite an advance. Navajo has sold at 4.25 to the extent of 500 shares. The company report a good surplus and bullion shipments that ought soon to yield a dividend. There has been a further advance in Belle Isle, which has sold as high as 1.00, and at the higher range of prices thus established displayed a good deal of strength. The improvement is said to be due to the development of good ore. About 1,100 shares have changed hands at 85 to 1.00, the closing price yesterday being 93.

Silver King has continued to rule firm at 5.12, and Horn Silver quiet but strong at 5.75 to 6.00. Eureka Consolidated has sold at 2.65 to 2.70. Green Mountain a shade easier, at 1.90 to 1.95, and Alice steady at 2.75. The Bodie group has remained quiet and without special feature, the only business comprising a few shares of Bulwer at 60 and of Standard Consolidated at 1.50 to 1.70, the latter showing an advance since last week. Consolidated Pacific steady at 55 to 59.

Colorado stocks have been inactive but steady, transactions including moderate sales of Chrysolite at 75 to 80, Leadville at 35, Little Chief at 30 to 31, Dunkin at 28 and Amie at 9.

The State Lines have displayed some signs of life, Nos. 1 and 4 being traded in to a moderate extent at 3 to 4 and Nos. 2 and 3 at 6 to 7. Oriental Miller has fluctuated between 14 and 16, Rappahannock in some request at 16 to 18, Central Arizona quiet at 22, Castle Creek at 18 and Sonora Consolidated at 3 and Harlem at 3.

The total sales for the week have been 23,800 shares on Saturday, 3,300 do. on Monday, 7,800 do. Tuesday, 16,500 do. Wednesday, 6,575 do. Thursday, 7,400 do. yesterday.—*New York Mining Record, Aug. 23rd.*

Cape of Good Hope Copper Mines.

Two of the wonderful copper mines of the world are the Speek-takel and the Ookiep, Cape of Good Hope, belonging to the Cape Copper Company. Year after year these mines have turned out large quantities of very high-grade ore, and have paid to their fortunate shareholders, on a capital of £160,000, profits aggregating £1,152,500, or roughly \$5,600,000. Since 1880 they have made annually 5,000 long tons of copper, from ore that in 1882 averaged 28.63 per cent. and in 1883 29.5 per cent. of metallic copper. With a reserve in the Ookiep, the principal mine, of 42,113 tons, it does not look as though low prices would in any way cause a reduction in the product. The mining cost was only 3s. 9½d. per unit; the profit was 11s. 11d. per unit, the company having its own railroad and its own smelting works in England, where 11,273 tons of ore were treated in 1883, at a profit of £9,150. The decline in values, of course, affected profits, the falling off in the average of prices in 1883 against 1882 being computed at £32,193. Still the company was able to make a net profit in 1883 of £101,131, against £145,464 in 1882 and £131,712 in 1881.



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GOOD BOATMEN

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The English Expedition up the Nile,

To Steer Boats Through the Rapids and do all Necessary Portaging.

Engagements to be for six months from September 1st, 1884.

Pay to be at the rate of from \$30 to \$40 per month, according to efficiency of each man.

Each man will be provided with an outfit, free rations, and all expenses paid from and back to place of his engagement. The men to be subject to the authority of their foremen and the officers under whose charge they may be sent out; such officers to have power of punishing insubordination or irregularity by stoppage of pay and, if necessary, by dismissal.

Men to report at Ottawa, 6th September, 1884.

Only thoroughly good and active boatmen will be engaged.

Married men to have the privilege of allowing their family to draw — per cent. per month of their pay.

All information in connection with the above can be had at the office of J. T. Lambert, 110 Wellington street, Ottawa.

By command, MELGUND,
Governor-General's Secretary.

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tributing points in Canada.**NOTICE TO CONTRACTORS**

SEALED TENDERS, addressed to the un-
designed, and endorsed "Tender for Post
Office, etc., Winnipeg, Man.," will be received
at this office until **TUESDAY**, the 2nd Sep-
tember next, inclusively, for the erection and
completion of

POST OFFICE, ETC.,

—AT—

Winnipeg, Man.

Plans and specifications can be seen at the
Department of Public Works, Ottawa, and at
the Dominion Clerk of Works Office, Win-
nipeg, on and after Monday, the 18th inst.

Persons tendering are notified that tenders
will not be considered unless made on the
printed forms supplied and signed with their
actual signatures.

Each tender must be accompanied by an
accepted bank cheque, made payable to the
order of the Honorable the Minister of Public
Works, equal to five per cent. of the amount
of the tender, which will be forfeited if the
party declines to enter into a contract when
called upon to do so, or if he fails to complete
the work contracted for. If the tender be
not accepted the cheque will be returned.

The Department will not be bound to accept
the lowest or any tender.

By order,

F. H. ENNIS,
Secretary.Department of Public Works,
Ottawa, Aug. 9th, 1884. [36-3]

NEW YORK

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Special Contracts made for time and
space.**CANADIAN MINING REVIEW.**Union Chambers, 14 Metcalfe St.,
OTTAWA.**MAIL CONTRACT.**

SEALED TENDERS, addressed to the
Postmaster-General, will be received at
Ottawa until noon, on Friday, 29th August,
1884, for the conveyance of Her Majesty's
Mails, on a proposed Contract for four years,
three times per week each way, between
Dunrobin and South March from the 1st
October next.

The conveyance to be made on horseback
or in a suitable vehicle, via the Postoffice at
Dunrobin when going, and by the direct route
when returning. The mails leave South
March every Tuesday, Thursday and Satur-
day as soon as possible after arrival of mail
from Ottawa, and to perform the journey to
March and back within three and three-
quarter hours.

Printed notices containing further informa-
tion as to the conditions of proposed contract
may be seen, and blank forms of tender may
be obtained at the Postoffices of Dunrobin,
March and South March, or at the office of the
subscriber.

T. P. FRENCH,

P. O. Inspector.

Postoffice Inspector's Office,
Ottawa, July 26th, 1884.**MAIL CONTRACT.**

SEALED TENDERS, addressed to the Post-
master General, will be received at Ottawa
until noon, on FRIDAY, the 29th AUGUST,
1884, for the conveyance of Her Majesty's
Mails, on a proposed contract for four years,
twelve times per week each way, between
CUMBERLAND and BUCKINGHAM RAIL-
WAY STATION, from the 1st October next.

The conveyance to be made on horseback or
in a suitable vehicle, and in a boat across the
Ottawa River.

The mails to leave Cumberland Post Office
twice daily (Sundays excepted) at such hours
as may be necessary to connect at Bucking-
ham Railway Station with mail trains pass-
ing east and west respectively. Exchange
mails with said trains and return to Cumber-
land Post Office within 30 minutes.

Printed notices containing further informa-
tion as to conditions of proposed contract
may be seen, and blank forms of tender may
be obtained at the Post Office of Cumberland
or at the office of the subscriber.

T. P. FRENCH,

P. O. Inspector.

Post Office Inspector's Office,
Ottawa, July 26th, 1884.**MAIL CONTRACT.**

SEALED TENDERS, addressed to the
Postmaster General, will be received at
Ottawa until noon, on Friday 29th August,
1884, for the conveyance of Her Majesty's
Mails, on a proposed Contract for four years
six times per week each way, between

**ARNPRIOR AND FITZ-
ROY HARBOUR,**

from the 1st October next.

The conveyance to be made on horseback
or in a suitable vehicle, via the Post Office at
Galeton and Mohrs Corners.

The mails to leave Fitzroy Harbour daily
(Sundays excepted) at 7.15 a.m. or in time to
arrive at Arnprior to have mails despatched
by morning mail train passing from Pem-
broke.

To leave Arnprior upon receipt of mail per
morning "mixed" at about 10.45 a.m. and to
return to Fitzroy Harbour within three hours
afterwards.

Printed notices containing further informa-
tion as to conditions of proposed Contract
may be seen, and blank forms of Tenders
may be obtained at the Post Offices of Arn-
prior, Galeton, Mohrs Corners and Fitzroy
Harbour, or at the office of the Subscriber.

T. P. FRENCH,

P. O. Inspector.

Post Office Inspector's Office,
Ottawa, July 26th, 1884

[35-3]

**MAIL CONTRACT.**

SEALED TENDERS, addressed to the
Postmaster General, will be received at
Ottawa until noon, on Friday the 29th August,
1884, for the conveyance of Her Majesty's
Mails, on a proposed Contract for four years
twenty four times per week each way between

**RENFREW POST OFFICE AND
RENFREW RY STATION**

from the 1st October, next.

The conveyance to be made in a suitable
vehicle.

The mails to leave Renfrew Post Office or
Railway Station as often and at such hours as
may, by the Post Office Department, be re-
quired, and to perform the trip from the
Post Office or Railway Station within ten
minutes.

Printed notices containing further informa-
tion as to condition of proposed Contract may
be seen, and blank forms of Tenders may be
obtained at the Post Office of Renfrew, or at
the office of the subscriber.

T. P. FRENCH,

P. O. Inspector.

Post Office Inspector's Office,
Ottawa, July 26th, 1884.

[35-3]

**GRAVING DOCK.**

BRITISH COLUMBIA.

SEALED TENDERS, addressed to the un-
designed, and endorsed "Tender for
Graving Dock, B.C.," will be received at this
office until SATURDAY, the 20th day of Sep-
tember, 1884, inclusively, for the construction
and completion of the partly finished

**Graving Dock at Esquimalt Har-
bor, British Columbia,**

According to plans and specifications to be
seen on after Monday, the 1st September
next, at the Department of Public Works,
Ottawa, and on application to the Hon. J. W.
Trutch, Victoria, B.C.

Persons tendering are notified that tenders
will not be considered unless made on the
printed forms supplied and prices affixed to
the whole of the items stated therein, and
signed with their actual signatures.

Each tender must be accompanied by an
accepted bank cheque for the sum of \$7,500,
made payable to the order of the Honorable
the Minister of Public Works, which will be
forfeited if the party decline to enter into a
contract when called upon to do so, or, if he
fail to complete the work contracted for. If
the tender be not accepted the cheque will
be returned.

The Department will not be bound to ac-
cept the lowest or any tender.

By order,

F. H. ENNIS,

Secretary.

Department of Public Works,
Ottawa, 8th Aug., 1884. [36-3]**MAIL CONTRACT.**

SEALED TENDERS, addressed to the
Postmaster General, will be received at
Ottawa until noon, on Friday, the 29th August,
1884, for the conveyance of Her Majesty's
Mails, on a proposed Contract for four years,
Six times per week each way, between South
March and Stittsville Railway station from the
1st October next.

The conveyance to be made in a suitable
vehicle, via Post Office at Carp, March-Hurst
Huntley, and Stittsville. The mails to leave
South March daily (Sundays excepted) at such
an hour as will enable Courier to reach
Stittsville Railway Station in time to make
connection with mail train passing to Ottawa
at about 1.00 p.m. To leave Stittsville Post
Office as soon as possible after the arrival of
said train, and to arrive at South March
within three hours afterwards.

Printed notices containing further informa-
tion as to conditions of proposed Contract
may be seen, and blank forms of Tender may
be obtained at the Post Office of South March
Carp, March-Hurst Huntley and Stittsville, or
at the office of the subscriber.

T. P. FRENCH,

P. O. Inspector.

Post Office Inspector's Office,
Ottawa, July 30th, 1884.**NOTICE TO MINERS.**

POWDER, DUALIN, FUSE, DETONATORS,
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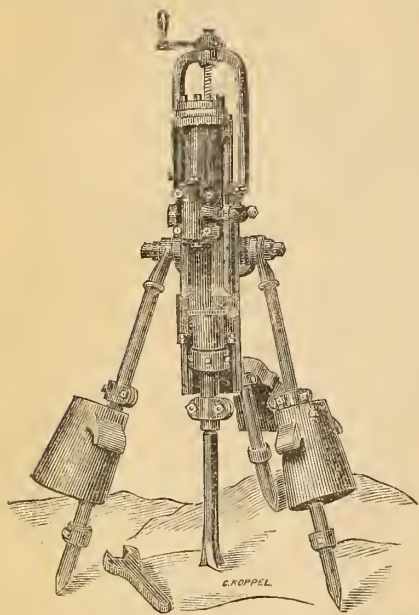
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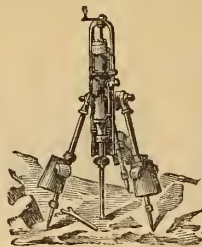
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Parties offering crystals for sale will please mention the
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—CHICAGO, ILLS.—

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shows have been uncovered on these
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On which are extensive surface shows and
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CANADIAN MINING REVIEW

VOL. 2.—No. 9.

1884—OTTAWA, SEPTEMBER—1884

VOL. 2.—No. 9

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lines to 1 inch).

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The CANADIAN MINING REVIEW is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts as well as others interested in Canadian Mineral Lands are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 5th of the month it is to appear.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

In another column we reprint an article from the *Victoria, B.C., British Colonist*, which has recently appeared in that journal under the heading "Provincial Rights to the Minerals." It would appear from the tone of this article as well as from the public notice of Mr. Vowell, the Gold Commissioner at Shuswap, that the Province of British Columbia will consider itself untakenly dealt with if the Canadian Pacific Railway Company, through the Dominion Government, does not reconvey to British Columbia all the valuable mineral deposits that may be found to occur, within the railway belt, on territory of

which the C. P. R. Co. is now the owner. In conveying to the Dominion Government these lands along the line of the railway, to be appropriated in such manner as it might deem advisable in furtherance of the construction of the railway, no reservation of the minerals was made. The C. P. R. Co. now holds the lands without any such restriction and it will be difficult to make good a claim of the Province to the mineral wealth within the belt.

Sir John Laws, and his practical chemist, Dr. Gilbert, of London, England, have brought out several new and important facts in connection with phosphate as a mineral manure which cannot fail to become a great source of revenue to Central Canada, and especially to the Province of Quebec.

The Lord Bishop of Ontario on his return home from the Rockies, expressed a high opinion as to the future of that great country, which is in itself a vast kingdom. Its agricultural, mineral and commercial prospects have impressed most favourably the large body of British Scientists, who formed the party with His Lordship. This meeting of the British Association in Canada will tend greatly to bring our country to the front in many respects, and the Bishop of Ontario is to be congratulated in being the prime mover in bringing to a successful issue this vast scientific gathering in our Dominion. Our resources, our people and our country will now be warmly discussed in the homes of our brethren across the sea, and the interest aroused will greatly advance the prospects of Canada.

The trip made by these scientific gentlemen to the Rocky Mountains was unattended by accident or casualty to cause a moment's inconvenience or discomfort, or to mar, in any

manner, their enjoyment of so extended a journey. The displacement of rock which occurred in the C. P. R. tunnel at the Rockies, when the visitors were examining it, might have proved more serious than it did. As it was, Dr. Selwyn, Director of our Geological Survey, narrowly escaped severe injuries; he, however, received nothing more than some bruises, to which he attached little importance.

Mr. J. F. Carll, State Geologist, of Pennsylvania, returned to his home during this month after having spent some weeks among the phosphate mines of Ottawa County. Mr. Carll came to Canada for the express purpose of thoroughly investigating our phosphate deposits in the interests of a party of American capitalists whose intention it is to acquire mining rights in the country, upon his favourable report, and to engage extensively in mining. Mr. Carll has carefully looked into everything connected with this mining industry, and the result of a still more careful examination of the mines in operation, as well as some undeveloped properties, has led him to express a very favourable opinion of the productiveness of the phosphate deposits of the district.

Mr. J. G. Miller, who for many years was identified with phosphate mining in Canada, was in Ottawa during the month. Mr. Miller has been engaged for the past three years in phosphate mining in the vicinity of Porto Rico. He was struck with the marvellous development of the industry in Ottawa County during the few years he had been away.

Mr. A. A. Humphrey was in Ottawa recently and gave a most interesting account of the gold mining operations which he is so successfully conducting in Beauce in Mr. W. A. Allan's interest and his own. He reports that the present prospects are more encouraging than he had dared to hope for.

The Harbert Telephone for private lines, advertised in another column, promises to be a useful instrument to miners. One has been erected at the the "Little Rapids" phosphate mine and saves the manager many tedious trips between the office and the works.

OUR PHOSPHATE TRADE.

The phosphate shipping season of 1884 is nearing its close, and when the balance of the output of the Ottawa county mines will have been forwarded across the Atlantic it will be found that the total shipments during this season of navigation will exceed, by several thousand tons, the output of any former year, and the quality of the phosphate already forwarded, and awaiting transportation, is of a much higher grade than that which our mines have ever before produced. As we showed, by a report of the mines in the last number of the REVIEW, the chief contributors to the general output this year have been the "High Rock" and the "Union Phosphate Company's" mines in Portland West, the "North Star" in Portland East, the "Emerald" in Buckingham Township and the "McLaurin and Blackburn" mine in the Township of Templeton. It is estimated that before the close of navigation these mines will have sent forward about 20,000 tons, and the probable output of the County of Ottawa will aggregate 23,000 tons. Of the mines in the du Lievre district none have developed more satisfactorily than has the "Little Rapids" mine in the First Range of Portland East. This property has been carefully and thoroughly worked into shape during the past few months for permanent mining on a mining-like system. Drifting has been started on the veins at different levels in the shafts with most encouraging results. Extensive bodies of phosphate of a superior quality have been exposed which more resemble the form of fissure veins

than anything that has been met with in the history of phosphate mining in the district. A hitherto undiscovered deposit of mineral has recently been uncovered on this property and has been partially opened up, and its further development will unquestionably add to the value of what is already a very valuable property. The "Little Rapids" mine will certainly be one of the large producers of the future. Each of the other mines above mentioned continue to yield an average daily output about as reported last month, and the superintendent of the Dominion Phosphate Company reports satisfactory progress at the company's "Washington" mine in Buckingham Township. In short nothing could be more encouraging than the reports received from the mines during the month. Mine owners have reason to be satisfied with the result of the year's operations, for, although prices have not ruled as high this season as they might have wished, the low rate for ocean freights at the opening of navigation, and for the past few weeks, has enabled shippers of phosphate to realize \$17 to \$18 per ton at Buckingham station, equivalent to one hundred per cent. profit all round on the cost of mining and transportation to that point.

The shipments of phosphate from the Perth and Kingston districts show a slight falling off from former years, and will probably not aggregate more than 2,500 tons, of which Capt. R. C. Adams' "Otty Lake" mine, in the Township of Burgess, has contributed about 800 tons.

The prospects for next year are very bright for Canada's phosphate industry. Many valuable properties in the County of Ottawa have been prospected during the past few months and their owners are making preparations for permanent mining in which they are justified by the flattering reports forwarded to them by their prospectors. It is not improbable also that before next year's output begins to move a large amount of foreign capital will have been invested in this industry. Our phosphate deposits are attracting the attention of English, European and American capitalists and hardly a day passes that does not record the arrival of some foreigner in our phosphate district, the object of whose mission is to thoroughly investigate with a view to acquiring mining rights. Numerous letters have

been received at this office from abroad asking for information concerning our phosphate deposits, and if property owners who have not the means to engage in mining will be but reasonable in their demand, there is no reason why a very large amount of foreign capital should not be available for the more rapid development of the phosphate industry. The following extracts from a report of Major Edward Willis, of Charleston, on this industry in South Carolina, which has appeared in the *N. Y. Mining Record* will serve to give our readers some idea of the magnitude and importance it is possible for phosphate mining to attain in the hands of an enterprising people.

"The importance of the phosphate business to Charleston cannot easily be overestimated. It has grown to such proportions that it has been felt necessary by the miners to form an exchange for the better regulation of the business. As an outcome of this feeling, the Phosphate Miners' Exchange was formed in March last, all of the miners of land rock in this vicinity, with unimportant exceptions, being members, and the plan has worked very satisfactorily.

The following table shows the value of the phosphate business, the shipments and consumption in the year just closed (September 1st), as compared with the preceding year, this year's being the largest on record and representing at the rate of \$6.50 a ton, a gross sum of \$2,659,169 for 1883-84.

	1883-84	1882-83
Shipments, foreign and coastwise, from Tons.	Tons.	
Charleston, and by rail.	196,714	183,011
Shipments from Beaufort	158,754	127,000
Total tons.....	355,468	310,011
Consumed by local manufacturers.....	53,635	42,620
Grand total tons...	409,103	352,631
<i>Phosphate Stock.</i>		
	Bid.	Offered.
Atlantic Phosphate Company Stock, par \$100	125.00	130.00
Stono " "	150.00	155.00
Etiwan " "	70.00	75.00
Edisto " "	98.00	98.50
Wando " "	95.00	98.00
Charleston Mining and Manufacturing Co. par \$100.....	165.00	170.00

Phosphate Quotations.

Latest advices quote Canadian phosphate in the English market at 1s. 3/4d. for 75 per cent. with a fifth of a penny rise. At this season of the year no advance is looked for over this price.

FREIGHTS.

Shippers of phosphate have secured tonnage during the past month at nominal rates. Ship owners have been offering as low as 1s. 6d. by steamer to London and Liverpool, and some contracts were made at 3s. 6d. per ton to each of these ports. Unfortunately a large portion of the year's output had gone forward at much higher rates during the summer.

A NEW INDUSTRY

IN CONNECTION WITH OUR PHOSPHATE TRADE

For the past year or more the feasibility and practicability of shipping the output of our phosphate mines, or a portion of it, in a ground state has been discussed, and it is apparent that this can be done to advantage from the fact that, after thorough investigation, two parties of American capitalists, who are each of them interested in phosphate mining in the du Lievre district, have simultaneously decided to engage in this new industry of grinding the phosphate rock, and for this purpose are now making the necessary preparations. The Union Phosphate Company have purchased a small mill on the du Lievre River, immediately south of the C.P.R. crossing at Buckingham, which they are fitting up with suitable machinery. Mr. G. H. Bacon, now of Ottawa, associated with some gentlemen of Boston and Charlestown, S. C., has leased some ground with the water privileges, known as the Bang's property, also to the south of the railway crossing of the du Lievre, and will engage extensively in this business. This venture, if it proves a success, should stimulate the phosphate mining industry, and doubtless it will, as it is the intention to utilize the low grade of rock for which there is at present no market in its unground state. The output of the mines situated in Templeton and Wakefield can be delivered in barges at a point near the mills.

A MONSTER CRYSTAL.

A phosphate crystal weighing eight hundred pounds has been presented to Mr. W. A. Allan, of this city, by the owners of the famous "Emerald" mine. It is a rare specimen and is the largest phosphate crystal known to have been discovered in Canada. Mr. Allan has had it placed in our office, where it may be seen by those who take an interest in such curiosities.

The Ontario silver mine, Utah, has shipped bullion amounting in value to \$1,128,067.64 during the twelve months ending August 31st. The receipts of bullion at Salt Lake City for the first eight months of the present year have amounted to \$3,647,332.48.

Distinguished Visitors

—AT—

OUR PHOSPHATE MINES.

Prof. W. BOYD DAWKINS, of Owens College, Manchester, England; WILLIAM TOPLEY Esq., of the Geological Survey of England, and H. BAUERMAN Esq., Royal School of Mines, both of London, England, visited the "Little Rapids" and the "Emerald" mines, and were very favourably impressed with the fine display of high grade mineral which met their eye in the bins and in the mines. These gentlemen are members of the British Association for the Advancement of Science, and it is fortunate that they were enabled to find an opportunity to examine these properties before returning to England. Prof. Dawkins has expressed himself, not only much interested by what he saw, but very much pleased, as well, to find that Canada possesses such extensive deposits of so valuable a mineral. His opinion, based chiefly on what he saw at the "Little Rapids" mine, is that mining has not yet reached a depth at which even much larger bodies of phosphate than what he saw might reasonably be looked for. Prof. Dawkins is one of England's greatest geologists and much value and importance is attached to his opinions, by the people of England, on all matters relating to geology and practical mining. That he should have formed so favourable an opinion of the prospects for the future of our phosphate mining industry is most gratifying to those engaged in it. In his trip to the mines Prof. Dawkins was accompanied by Dr. J. A. Grant and Mr. W. A. Allan, of Ottawa.

Ottawa Colonization Railway.

The "Short Line" to be Built.

The construction of this railway has been, for the past two years, a subject of much interest to the phosphate mine owners in the du Lievre district, and, although the holders of the charter have repeatedly asserted that work was to be at once begun on the line, up to the present moment not a sod has been turned. It was at one time supposed that the President of the company had overcome all monetary difficulties when he induced a party of American capitalists to take up this enterprise, together with the construction of the Gatineau Valley Railway. Shortly after this was accomplished the company started grading northward on the last mentioned road, and after a few miles had been graded operations were suspended. Since then there appears to have been a mystery hanging over the movements of those who are behind the scenes. When it was found that the con-

struction of the Ottawa Colonization Railway from Buckingham northward was likely to be indefinitely delayed, the phosphate shippers made a request that the company should build that portion of the line which would connect Buckingham village with the Canadian Pacific Railway at Buckingham station, to enable them to forward the output of the mines direct from the landing on the du Lievre River at Buckingham village to Montreal, and thus save the expense of transshipping in waggons over three miles and a half of road, almost impassable at any season of the year, and altogether impassable during the spring and autumn months. This request having been stubbornly disregarded by the company, some of the enterprising phosphate miners offered to construct these three and a half miles of roadway under the Ottawa Colonization Railway charter, and to agree to hand over the same to the company when it should find itself in a position to reimburse them the actual cost of construction. This offer has been made by two distinct parties of mine owners and rejected. A gentleman of this city, who is deeply interested in our phosphate industry and is an extensive owner of phosphate lands in Ottawa county, and who has already invested a large amount of money in the O. C. R. made the proposition to construct this *short line* himself on equitable terms. His offer has also been disregarded. The time has

now arrived when we may ask, where lies the mystery? Judge Sypher, of Philadelphia, representing the supposed American capitalists, was in Ottawa recently. What was the object of his visit? and did he accomplish it if he had one? It is certain that he studiously avoided meeting the very men who ought to be consulted before any new movements were decided upon, and from what we can learn, some arrangement has been entered into between this company and the Canadian Pacific Railway Company. It is now a settled fact that the C. P. R. Co. are to construct the *short line* and work will be begun thereon at once. A game of bluff has been going on between the Sypher party on the one hand and Mr. Van Horne on the other, and it would appear that the latter has *drawn* most successfully. It is natural to suppose that Mr. Van Horne will build this branch line under the Occidental Railway charter, and, if such is the case, can it be that Judge Sypher and the American capitalists associated with him will have permitted this to come to pass without receiving some substantial consideration from Mr. Van Horne? And why have Mr. Mackintosh, the President of the Ottawa Colonization Railway, and Mr. Allan, the Vice-President, been kept in ignorance of this deal? That there has been intriguing at the expense of some one, there can be no doubt, but the road is to be built and phosphate shippers will be glad to know it.

city of Mexico, are as direct consequences of the production of so much gold and silver from the mines of this country since 1848, as is the existence of such a city as San Francisco upon the shores of the Pacific. Even the fact that California has at present fully 125,000 acres of lands planted in vineyards worth on an average at least \$200 per acre, and that the State possesses fully *one-tenth* of all the sheep in the United States, and produced 40,840,000 pounds of wool in 1883, may be rightly ascribed to the production previously of so much gold from its teeming placers. To the same cause, also, may be attributed such commercial results as the shipment from San Francisco during the nine months ending the 31st of March, 1883, of wheat and flour to the value of nearly \$22,000,000. But independently of these and many other as remarkable agricultural results incident to or consequences, as we maintain, of the gold and silver output of our Pacific Coast mines, the actual dividend results, which were reported in the *Mining Record* during the calendar year 1883, make a most satisfactory showing, as may be seen from the following extract of them:

	Mines.	Amount paid.
Arizona	4	*\$1,162,500
California	11	1,119,976
Colorado	16	†1,323,250
Dakota	3	665,000
Georgia	1	28,000
Idaho	4	85,000
Michigan	5	2,670,000
Montana	5	†513,824
Nevada	8	856,000
New Mexico	1	500,000
Utah	5	1,582,000
Total		\$10,505,550
Sonora, Mexico		200,000
Nova Scotia		15,000
Total		\$10,720,550

Subtracting from the foregoing the product of the copper mines of Michigan and of the quicksilver of California, in the aggregate \$3,130,000, as also \$215,000 derived from the gold mines of Sonora and Nova Scotia, and we have \$7,375,550 as the dividend result of mining corporations, upon a total product for the year 1883, reported by Mr. J. J. Valentine, of the States west of the Mississippi and of Missouri, as follows:

Gold	\$27,816,640
Silver	42,975,101
Lead	\$8,163,550
Copper	‡5,683,921
Total	\$84,639,212

The dividends thus aggregating \$7,375,550, and constituting $8\frac{3}{4}$ per cent. of the whole value of the copper and lead as well as the gold and silver mined in the Western States, we repeat, were paid exclusively by incorporated mining companies, while much the larger part of that product was derived from mines not owned by corporations but by individuals or by private companies that have made no report of dividends or profits.

To sum up, we may state that for the six years ending December 31, 1883, the dividends reported by those incorporated companies, and the product of the Pacific Coast mines annually, have been about as understated:

	Amount of reported dividends.	Product.
1878	\$21,100,000	\$ 78,277,000
1879	9,200,000	72,689,000
1880	9,500,000	77,233,000
1881	12,675,000	81,299,000
1882	10,950,000	89,208,000
1883	10,690,000	84,640,000
Total	\$75,115,000	\$483,246,000

That is to say, the shareholders in incorporated companies have received as much as $15\frac{5}{8}$ per cent. of the amount won from the mines for the period in question. And in the face of such facts and figures, there should be less gabble about the alleged precariousness and unprofitableness of the business of mining for the precious metals.

*This does not include the dividends which were paid to the extent probably of \$200,000, we are very sure, by the Grand Central of Tombstone.

†Does not include dividends probably paid by the R. E. Lee mine of Leadville during 1883.

‡Does not include dividends paid by several important properties at Butte of which we could elicit no report.

\$This lead was derived from silver bearing ores.

||This does not embrace copper from the mines of Michigan.

The Dividend Results of the Mining Industry for 1883.

(N. Y. Mining Record.)

The industrial and economic importance to the country of its mines, of the money metals and of copper and lead, and in fact of coal and iron, is by no means to be measured by the mere sum total of dividends or profits that have accrued to their owners year by year from their exploitation. Far from it. The production of gold from the mines of California to the amount of say, \$1,175,000,000 between 1848 and 1883 is in nowise to be gauged in its economic consequences to the people of the country by the actual share of it that went into the pockets of those who either by their labour or capital extracted it from the earth. Nor is the product of the Comstock lode, variously estimated at from three hundred to three hundred and fifteen millions of dollars, to be considered from the point of view of the profits which accrued to the shareholders of various corporations. The consequences of our production of the money metals since 1848 reach immeasurably beyond any totality of actual profit derived by individuals or corporations engaged directly in the industry of their extraction and to an extent not approached, even approximately, by the product of any other industry whatsoever.

Imagine the commercial and industrial condition of our country, and indeed of the world at large, at the present writing, without having had during the last thirty-five years the steady stimulus of the immense amount of gold furnished in the aggregate from the placers of the Pacific Coast States and Territories together with that of the mines of Australia, the discovery of which, unquestionably, was a direct consequence of the finding of gold in California in 1848. These discoveries, be it remembered, happening as they did, at a time of world-wide industrial and commercial adversity and indeed of a *money famine*, immediately served to restore life and health in every workshop of Europe and America. It opened new homes for the starving people of Europe and new regions for human intelligence and energies to develop with a profitable scope and reach hitherto wholly unknown in the history of the earth. The three or four railways which to-day stretch across our national territory from the Atlantic to the Pacific, with another extending from our southern border to the

LAKE SUPERIOR MINES.

The Huronian Takes the Lead,

AND MAKES ANOTHER SHIPMENT OF BULLION.

A ZINC MINE

—AND—

OTHER VALUABLE MINERAL DEPOSITS.

MORE IMPORTANT DISCOVERIES.

During the past month we have been able to collect some reliable information relative to the mining industries on the north shore of Lake Superior and the present condition of the mines that are now being developed. From what we have learned there can be no question that the developments, up to date, at the famous "Huronian" have placed it far in advance of all the mines in the district, and have established its reputation as a gold and silver producer. A ten stamp mill is in operation on the company's property, which turns out a ton of concentrates daily, besides the metal which is saved in the amalgamated copper plates. The ore is partly free milling, and what is not caught in the plates is concentrated over a Freu Vanner. It has been decided to treat the concentrates at the mine by the chlorination process, and for this purpose works will be at once erected. The main shaft is down 100 ft., and 100 ft. of drifts have been run on the vein, which is 6 ft. to 8 ft. in width, and has been prospected for 2,000 ft. in extent. It is a true fissure vein, drifting to the north-west at an angle of about 70°, and carrying gold and silver in large quantity. The average surface ore has yielded \$36.30 in gold and \$13.00 in silver, while an assay of some of the high grade ore returned \$5,971.60 per ton, of which \$4,652.03 was gold and \$1,219.57 silver. The vein occurs in a formation of semi-crystalline, greenish slate, in the Huronian series. Specimens of the quartz from the vein have been forwarded to this office, in which free gold can be seen with the naked eye to be well distributed. The company does not look for profit from the very high grade ore so much as from the entire vein-stone, every pound of which yields gold and silver in paying quantities. This vein carries sylvanite, a compound of gold, silver and tellurium, a mineral never before met with in any mine in the Dominion. In addition to other plant, the company has a separate hoisting engine at the main shaft and a tramway from the shaft to the mill; also a saw-mill attachment for cutting lumber, etc. The mine, which is situated about 100 miles from Port Arthur and 50 miles from Savanne, a station on the C. P. R., was visited recently by Messrs. Hiram Robinson and W. A. Allan, of Ottawa, stockholders in the company, and Mr. Alexander Fraser, one of the Directors. These gentlemen returned to Ottawa very much pleased with what they had seen, and bringing with them a handsome bar of gold, weighing about 20 ounces. As soon as the heavy expenditure necessary to equip the mine ceases the Huronian company will unquestionably pay large dividends. Several shipments of bullion have already been made, and one of concentrates. The last bullion shipment was forwarded from the mine at the beginning of the present month. The company is a strong Canadian organization, as the following names of the Directors will show: James MacLaren, President Bank of Ottawa, President; Thomas A. Keefer, Esq., Port Arthur, Vice-President; Charles T. Bate, Mayor of Ottawa, Secretary-Treasurer; Hugh McKay, Esq., Montreal; Alexander Fraser, Esq., Westmeath; Peter McKellar, Esq., Manager at the mine; Robert Blackburn, Esq., New Edinburgh, Francis Clemow, Esq., Ottawa, and Alexander Johnston, Esq., Strathroy. Adjoining the "Huronian" property is the "Highland" location, on which some development work was done during the past summer. This mine, as well as the "Huronian," was visited by Professor Selwyn in 1883, and, as the following letters will testify, his observations lead him to form a very high opinion of the value of these properties.

Department of the Interior (No. 95),

Geological and Natural History Survey,

OTTAWA, Feb. 22, 1884.

Thos. A. Keefer, Esq., Port Arthur, Lake Superior:

MY DEAR SIR,—I have pleasure in transmitting you herewith Mr. Hoffman's analysis of the samples of quartz which I collected from the openings made on the extension of the Jackfish (Huronian) vein. The

average result gives 6.497 oz. of gold and 26.129 oz. of silver to the ton of 2,000 lbs. This must be regarded as an exceedingly satisfactory showing, and fully justifies further judicious expenditure in opening up the vein and having a practical test made of larger parcels of the quartz.

I am, my dear sir,

Yours faithfully,

(Signed)

ALFRED R. C. SELWYN.

OTTAWA, April 29, 1884.

Thos. A. Keefer, Esq.

MY DEAR SIR,—I am in receipt of your letter of the 20th inst. I am sorry I have no time to write you a report on the Highland mining location, which I visited and examined last summer. I can, however, state that it is, I consider, the continuation of the vein which traverses the adjoining Huronian, or old Jackfish, property, already proved to be exceedingly rich in sylvanite and gold. Both these properties are exceedingly favourably situated for working. From the five small openings made on the vein in the Highland property I took samples which appeared to represent the average character of the vein through a length of 300 yards. These were carefully assayed in the geological survey laboratory, with the very promising result given you in my letter of 22nd February last. There can be no doubt that this is as rich a gold-bearing vein, indeed the richest and most promising gold-bearing vein I have yet seen, in the Huronian rocks, and the country rock, a rather soft chloritic schist, will greatly diminish the cost of extracting the vein. The greatest difficulty I should apprehend is in the separation and the saving of the whole of the gold contained in the ore, and very great care will have to be exercised in this respect.

I am, my dear sir,

Yours faithfully,

(Signed)

ALFRED R. C. SELWYN.

The "Rabbit Mountain" silver mine has produced some very rich ore, some of which, taken from the vein within ten feet of the surface, has yielded as high as \$852.50 per ton. Up to the present time the owners have done very little actual mining but the services of Captain John Tretheway, the late Superintendent at Silver Islet, have been secured, and he will undertake the management of the company's operations in the future, and will no doubt do justice to the property. The owners of this mine are to be incorporated the "Rabbit Mountain Mining Company of Ontario," with the following gentlemen as the first directors: Maurice Auerbach, Esq., Hagbarth Shalgaard, Esq., J. H. Burwell, Esq., D. H. Moon, Esq., G. V. Bacon, Esq., of St. Paul, Minn., Marcus Johnson, Esq., of Atwater, Minn., and Gen. E. A. Wild, Oliver Daunais and Thomas A. Keefer of Port Arthur. The capital stock is to be \$2,000,000.

A zinc blende mine, situated about fourteen miles inland, north east from Neepigon Bay, promises to become an important feature in the mineral development of the Lake Superior district, and it is to be hoped that the very flattering report on the deposit made by Mr. E. Hindman, who is connected with the Matthiessen and Hegeler Zinc Company, of LaSalle, Illinois, may be borne out as mining proceeds.

The Arctic Mining Company is opening up a vein of argentiferous galena on the north shore of Black Bay with gratifying results, it is said.

On the main shore, about three miles inland, the "Gold Lake" mine has been partially opened. It produces copper pyrites ore carrying from 4 to 13 per cent. in copper and \$35 in gold and silver to the ton. A shipment of the ore, it is stated, has been tested at Swansea and yielded \$33 per ton, with the market price of copper very low.

Several new discoveries have been made during the past summer of mineral deposits in the Lake Superior region that are not unlikely to prove very valuable. Oliver Daunais, the discoverer of the "Rabbit Mountain" mine, came upon another silver deposit which is said to be of equal importance, and Mr. E. Emmons, an explorer of long experience in the district, is reported to have discovered a rich deposit of native silver among the same black silver slates in which the "Rabbit Mountain" vein occurs.

Now that the fact has been established that the mining industries on the north shore of Lake Superior will play an important part in the future development of that portion of the Province of Ontario, the time has arrived when the Provincial Government should adopt active measures towards building colonization roads to facilitate access to the several townships that have been surveyed. Up to the present time the mine owners have been obliged to open roads at a very heavy expense, and the Government should now come to their assistance in this respect.

GOLD MINING IN BEAUCE.

The Gilbert River Gold Mining Company, operating on the Gilbert River in St. Francois, Beauce, has had a successful season and has washed more gold than in any former year. The reports that have reached us from the district are, however, of a general character and do not mention the value of the gold that has been mined. Other less important operators in the district, it is said, have washed gold in sufficient quantity to pay a handsome profit on their expenditure, notwithstanding that their operations have been conducted on very primitive principles. During the past month a fair amount of work has been accomplished at the Allan and Humphrey mine on Slate Creek, in St. George Concession. A temporary suspension of work has, however, been occasioned at this mine in consequence of a flow of water coming into the shaft when the gravel was reached close to bed-rock. The water came in so rapidly, carrying with it sand in such quantity as to impede the working of the pumps. Resumption of mining in the shaft will be delayed until some work has been completed that will effectually prevent any inconvenience in the future that might be occasioned by water. Within a short distance from the shaft Messrs. Allan and Humphrey are boring by means of an eighteen inch auger, worked by steam power, which will be driven down to bed-rock. As the auger descends, tiles, manufactured for the purpose, will be let down, forming a pipe, through which the water will be continuously pumped, thus keeping the shaft perfectly dry. This delay in their operations is very annoying to the owners of the mine, happening, as it has, just at a time when their most sanguine expectations were about to be realized. The sand and gravel raised from the shaft, for some days before the water made its appearance, was richer in gold than any ground that has ever before been met with in the district. The sluices are now about completed and it will not be long before we will receive a report of the first wash-up. The opinion of men of long experience in the placer mines in Australia and California, who have visited this mine during the past few months, predict that the result of the washing will be a surprise to many who are now skeptical, and the opinion of such practical men can be relied on.

The pool of Lake Superior copper producers, of which the Calumet and Hecla is the chief constituents, has sold to New York brokers, for American manufacture, 20,000,000 pounds of ingot copper, to be delivered by the 5th of January, 1885. The contract price is 13 cents.

Asbestos Mining in Canada.

In the Township of Thetford, asbestos mining has become an industry of much importance to that section of the Province of Quebec. This mineral has been found to occur in nearly all of the Provinces of the Dominion, but as yet no mining has been done outside of the eastern townships. In the Townships of Thetford, Broughton, Coleraine and at Wolfstown and Danville, mines have been opened and a large quantity of mineral has been taken from them. The Thetford mines are, however, the principal producers, and their output is rapidly gaining favour in the American and European markets, so excellent is the quality of the asbestos mined. The Boston Asbestos Packing Co. are carrying on extensive mining operations on their property in Thetford, and employ 80 miners and workmen, the monthly output averaging about 75 tons. King Brothers employ 40 hands at their mine in the same township and produce about 35 tons monthly. The Johnson's Company's mines, in Thetford, are yielding a very superior quality of asbestos and in fair quantity. The force employed does not exceed 60 hands, and the output averages two tons daily. The veins of asbestos on this company's property are of a most superior quality, and a large proportion of the product of its mines is shipped throughout the year to all parts of the globe, especially to the European market where the demand is beginning to overrun the supply. One of the firms in Europe who have been using this company's asbestos, has secured the contract for supplying Her Majesty's navy with asbestos goods, and has further obtained orders from the Indian State Railways, and from many of the most important railway companies in Europe; the leading European Iron and Steel Manufacturers, Engineers and Steamship Companies are also supplied with asbestos goods by the firm referred to. The mill-board, manufactured from the Johnson's Company's asbestos, has been tested, both in England and Scotland, before government officials and managers of public works, by steam, boiling water and blowpipe, and has, in every instance, withstood the tests most satisfactorily.

It is not unlikely that many new mines will be opened, and that a greatly increased quantity of asbestos will be produced in Canada during the next few years.

During the fiscal year ending 30th April, 1884, the Calumet and Hecla mine produced no less than 35,414,007 pounds of ingot copper.

The Horn silver mine of Utah shipped for the week ending September 3rd, bullion to the value of \$57,000, making the total shipments for the year to that date \$1,669,000.

THE MICA MINES.

A fine quantity of excellent mica is being produced at the mines in operation. In Villeneuve the crystals are increasing in size as depth is reached, and are, if possible, improving in quality. This mine is developing most satisfactorily and will supply a large proportion of the demand in Canada. The Sydenham mine has produced abundantly during the past summer and continues to be very productive; the quality of the mica is, however, much inferior to that from Villeneuve and is amber in colour. The output of the mine has been shipped largely to the United States. Several other deposits in Eastern Ontario have been partially developed and promise to yield a good quality of mica in large quantity. We have received from the Villeneuve mine, during the past month, slabs of crystals that have cut into perfect sheets, without a speck or flaw, measuring 6 x 9, and the quality is equal to the North Carolina mica.

St. Onge Gold Mining Company to be Incorporated.

Notice has been given in the *Canada Gazette* that application will be made to His Excellency the Governor General in Council, for a charter of incorporation by letters patent under "The Canada Joint Stock Companies Act, 1877," incorporating the applicants and such other persons as may hereafter become shareholders in the said company, a body politic and corporate for the purposes following, that is to say:—

1. The proposed name of the company is the "St. Onge Gold Mining Company (limited)."

2. The purposes for which incorporation is sought are as follows:

(1) To carry on the business of exploring for, mining and gathering gold, silver and other precious metals, minerals and ores in such form as the same may be found in the Province of Quebec and elsewhere throughout the Provinces and Territories of the Dominion of Canada.

(2) To crush, smelt, reduce and manufacture such metals, minerals and ores, and forward, ship or sell the same, either in crude or other form throughout the Dominion of Canada and elsewhere, and for such purposes to establish works, wharves, factories, warehouses, and acquire real estate for the purpose of erecting and establishing the same thereon.

(3) To purchase, take on lease or exchange, take, acquire, own and hold under any legal title either in the name of the company, or as trustee or trustees therefor, for them, their successors and assigns any real or personal property, and such lands, premises, easements,

claims and mining locations, limits and rights as shall be necessary or desirable for the workings and purposes of the company, with power to pay for any of such, in whole or part, by the issue of shares of capital stock of the company and to declare such shares fully pay up and unassessable; to sell, lease assign and transfer the same, in whole or part, and to work and develop such mines and mineral deposits as may exist thereon.

(4) And generally to do all such other things as are conducive or incidental to the attainment of all or any of the objects aforesaid.

4. The chief place of business of the said company is to be at the City of Quebec, in the Province of Quebec.

4. The intended amount of the capital stock of the said company is ninety thousand dollars, divided into nine hundred shares of one hundred dollars each.

5. The names in full, addresses and callings of the said applicants are as follows:—

Louis St. Onge, of the Parish of St. George, in the County of Beauce and Province of Quebec, miner; Antoine St. Onge and Noel St. Onge, both of the same place and occupation; Albert Alexander Humphrey, of the same place, Esquire, and William Anderson Allan, of the City of Ottawa, contractor, the first one and last two persons named to be the first of provisional directors of the company.

The Gold Mining Association of Canada.

Reports have been published in the Canadian press during the present month, relative to the industrial condition of the above named corporation, the truth of which we have been unable to substantiate. The Company's Managing Director was in Ottawa since the circulation of the reports referred to, and assured us that mining operations are yet being carried on, and that the result of last year's work was most satisfactory, gold having been washed in sufficient quantity to defray expenses, and a great deal of work was done exclusive of actual mining. This Company's property is situated on the Du Loup River, in the County of Beauce, and the ground carries gold in paying quantity. A system of hydraulic mining has been adopted, in preparing for which the expenditure of a vast amount of capital has been necessary. The future success of the Company's operations will only be secured by a strict observance of economy in the management by the superintendent. The prospects of the mine have warranted the outlay, as last year's operations proved, and as it was the intention of the company, from the outset, to mine on an extensive scale, the expenditure, thus far, has been one of necessity. It has been stated that the Marquis of Lorne was among the most liberal

subscribers to the capital stock of the Gold Mining Association of Canada, but this has been emphatically denied.

The mines in Beauce, now being so successfully operated by Messrs. Allan & Humphrey are situated many miles from this company's property, and are in no way connected with it. We mention this so as to correct an erroneous impression that these properties and their owners are closely allied.

Provincial Rights to the Minerals.

Some disquietude has for a long time existed among British Columbians from the fact that a large portion of the mineral deposits in that Province comes within the railway belt, and it has been feared that the Canadian Pacific Railway Company would gobble it up. In commenting on the subject the *Victoria British Colonist* remarks:—

"The public may rest secure in the assurance that the rights of the province to the minerals within the railway belt will be conserved by the Government. It is now no secret that the Dominion Government have laid claim to the rich deposits of future wealth and greatness comprised within the belt. By the 109th section of the British North America Act, all lands, mines, minerals and royalties belonging to the several provinces are secured to them in the following terms:

"109. All lands, mines, minerals and royalties, belonging to the several Provinces of Canada, Nova Scotia and New Brunswick at the Union, and all sums then due or payable for such lands, mines, minerals or royalties, shall belong to the several provinces of Ontario, Quebec, Nova Scotia and New Brunswick, in which the same are situate or arise, subject to any trusts existing in respect thereof, and to any interest other than that of the province in the same.

"And section 11 of the terms of union the province agrees 'to convey to the Government, in trust, to be appropriated in such manner as the Dominion Government may deem advisable in furtherance of the construction of the said railway, a similar extent of public lands along the line of railway * * * as may be appropriated for the same purpose by the Dominion Government from the public lands in the North-West Territories and the Province of Manitoba.' There is nothing in the extract quoted conveying the mines and minerals which by section 109 of the B. N. A. Act are specially reserved for the use and enjoyment of the several provinces. To our mind the title of the province seems clear, and the Government would fail in their duty should they neglect to enforce the rights of the province."

In connection with this difficulty

the Gold Commissioner at Shuswap, B.C., has published the following:

"Public notice is hereby given that the Provincial Government of British Columbia have not recognized the claims advanced by the Dominion Government of Canada to the precious metals within the 20 mile belt on each side of the line of the Canadian Pacific Railway through British Columbia. The provision of the mining laws now in force through the Province of British Columbia, will be enforced within the railway belt, as well as in all other places in this district, by the undersigned until such time as official instructions are received to the contrary. All persons interested must govern themselves accordingly.

(Sd) A. W. VOWELL
Stipendiary Magistrate
and Gold Comm'r.

Shuswap, B.C., Sept. '84."

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The great event of the year 1884 in the Dominion of Canada has been the 54th annual meeting, held in Montreal, of the British Association for the Advancement of Science, at which 1,500 members, home and foreign, were in attendance. The sessions were devoted to the reading of papers on scientific subjects and to discussions amongst the scientists present. The meeting was divided into sections as follows:

- A—Mathematical and physical science.
- B—Chemical science.
- C—Geology.
- D—Biology.
- E—Geography.
- F—Economic science and statistics.
- G—Mechanical science.
- H—Anthropology.

As Professor C. D. Wilber, who was present at the meeting, has stated, "these are convenient divisions of the whole field of human investigation. The practical intent of the British Association is simply to 'post the books' of the toilers in these fruitful fields during the past year, and with auguries and divinations cast the horoscope of discovery and invention for the coming year.

The importance to Canada of this meeting of the British Association for the Advancement of Science cannot be overestimated when it has been the means of bringing to the country a thousand scientists, among whom were numbered many of England's most learned men. Since the close of the meeting in Montreal the members of the association have been travelling in detachments over the length and breadth of the Dominion, and will return to their respective homes more familiar with Canada and possessed of more reliable information as to her natural resources than they could have gathered in

years through any other channel than personal observation. A very large number of the visitors have been to the Rocky Mountains, and the unanimous opinion they have formed of the North-West Territories is a most flattering one, and will doubtless be the means of advertising the country as a suitable and attractive home for British and European emigrants. Of our mineral resources time did not admit of such a thorough investigation as could have been wished; nevertheless many of the scientists attached to the geological section found an opportunity to visit some of our mines in operation, and in the vicinity of Ottawa the phosphate mines appeared to possess an especial interest for those who examined them. At the meeting in Montreal, in the course of a review of our numerous rich mineral indications, a serious defect was brought to light by one of the leading geologists and mining authorities in England—namely, that Canada, of all the colonies, is the most destitute of information concerning mineral reports and statistics available for reference. The fact was brought out in the discussion that followed Mr. W. Hamilton Merritt's paper on the "Occurrence, locations and output of the economic minerals of Canada." In the course of the paper the lack of reliable statistics on the above was alluded to, as there exists no department for the collection of reports and statistics on mining under the Dominion Government. In the discussion following, the president of the section spoke very strongly on the necessity of mining encouragement and successful development by the existence of some such department. Mr. Clement Le Neve Foster, F.G.S., of Wales, stated that it was first at a meeting of the British Association and in this section, that the collection of mining statistics in England was suggested, and that he considered the visit of the Association to Canada would not be thrown away if it had for its outcome no other result than the establishment in Canada of some system for collecting reports and statistics relating to mining and mineral development. Mr. Foster considered the Government would do well to take some steps in the matter, and suggested the English system as a basis. The same gentleman also brought before the section the unpleasant fact that the Committee of Inspectors of Mines, in preparing last year, for the Home Office, a report of the mineral statistics of the British colonies, when they came to Canada, experienced great difficulty in securing information. All sorts of sources had to be resorted to, and the result was very imperfect and unsatisfactory. This being the state of things, it would appear that, in the interest of what should be one of our greatest natural sources of wealth, the advisability of taking some steps in the matter cannot be questioned.

Much is done for agriculture and

forestry, and it is evident that in our country, so full of valuable mineral indications, from Nova Scotia to British Columbia, more attention should be given to mining.

MINERAL GEMS.

Mr. Willimott, a member of the Geological Survey, has had a most successful season in his researches through Central Canada for mineral specimens. He has succeeded in adding to the collection in the Museum many gems in the form of crystals, spheens and zircons, and some of the garnets he has recently collected excel in beauty anything ever before found in Canada. Mr. Willimott is a painstaking and efficient officer, and is to be congratulated on the present appearance of the Museum. The classification and arrangement of the specimens have had his personal supervision, and the result is evidence of his skill in such work.

Ancient Method of Washing Gold.

The gypsies of the Bannat, in Austro-Hungary, in washing the gold from the sands of the rivers and plains, still use a very antiquated system, out of which, no doubt, the modern systems have grown. It is practised now by the gypsies, as it was by the Romans in the same country. It consists in nothing more than pouring the sand, mixed with water, over an inclined plane, the heavier particles of the gold remaining upon the surface, while the light impurities are washed away. Sometimes the inclined plane is covered with woollen cloth, to which the gold adheres; wanting the cloth, the Gypsies now and then use for the same purpose the more ancient substitute of a fleece. The manner of collecting gold dust on sheep's fleeces, upon inclined planes, is represented in the curious old works of Agricola.

In the rivers of Colchis the custom is still retained of placing sheep skins in the beds of the Phasa and other auriferous streams to collect particles of gold; hence, the dedication of such fleeces to the gods, and the fabulous history of the Argonauts, as far as it related to the Golden Fleece.

The more common manipulation among the gypsies of Bannat, as far as the gold washing is concerned, is performed by means of a plank of lime tree, six feet long and an inch and a half thick. At the upper extremity is a small trough, and across the board are about a dozen grooves or furrows cut in the wood. The plank is set at an angle of forty-five degrees. The sand is put into the trough at the upper end, and thence, by plenty of water, washed down the sloping board. The gold dust falls into the grooves, whence it is scraped or brushed off. It might be supposed that a great

deal of gold is lost by the careless method, but long experience has made the gypsies very expert; they know how to distinguish the rich and poor sand, and a careful examination of the tailings proves that hardly a particle of gold escapes them during the operation. The gold is in the form of a fine dust; the sand containing it is mixed with black particles of highly magnetic iron, garnets and mica.

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A second-hand "Ingersoll" Rock Drill, three inch cylinder, with couplings, &c. Any person having one for sale will please communicate with the publishers of the CANADIAN MINING REVIEW.



NOTICE TO CONTRACTORS.

SEALED TENDERS addressed to the undersigned, and endorsed "Tender for Post Office, &c., Orangeville, Ont.," will be received until Thursday, the 23rd day of October next, inclusive, for the erection of

Post Office, &c.,

AT

ORANGEVILLE, ONT.

Plans and specifications can be seen at the Department of Public Works, Ottawa, and at the Post Office, Orangeville, on and after Monday, the 6th day of October next.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque, made payable to the order of the Honorable the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party declines to enter into a contract when called upon to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

By order,
F. H. ENNIS,
Secretary.

Department of Public Works,
Ottawa, Sept. 8th, 1884.

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SEALED SEPARATE TENDERS (including plans and specifications), addressed to the undersigned and endorsed respectively: (1) Tender for Heating Apparatus, Three Rivers, P.Q., Post Office; (2) Tender for Heating Apparatus, Sherbrooke, P.Q., Post Office; and (3) Tender for Heating Apparatus, Cornwall, Ont., Post Office, will be received at this office until FRIDAY, the 16th October next, for the completion of the above works.

Copies of plans of the buildings proposed to be heated and a memorandum of requirements will be furnished to those desiring to tender, who will be required to indicate the arrangement, &c., of their apparatus and furnish a fully detailed specification.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque, made payable to the order of the Honorable the Minister of Public Works, equal to 5 per cent. of the amount of the tender, which will be forfeited if the party decline to enter into a contract when called upon to do so, or, if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

By order,

F. H. ENNIS,

Secretary.

Department of Public Works,
Ottawa, 8th Sept., 1884.

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GRAVING DOCK.

BRITISH COLUMBIA.

SEALED TENDERS, addressed to the undersigned, and endorsed "Tender for Graving Dock, B. C.," will be received at this office, until SATURDAY, the 20th day of September, 1884, inclusive, for the construction and completion of the partly finished Graving Dock at Esquimalt Harbor, British Columbia.

According to plans and specifications to be seen on after Monday, the 1st September next, at the Department of Public Works, Ottawa, and on application to the Hon. J. W. Trutch, Victoria, B. C.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied and prices affixed to the whole of the items stated therein, and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque for the sum of \$7,500, made payable to the order of the Honorable the Minister of Public Works, which will be forfeited if the party decline to enter into a contract when called upon to do so, or, if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

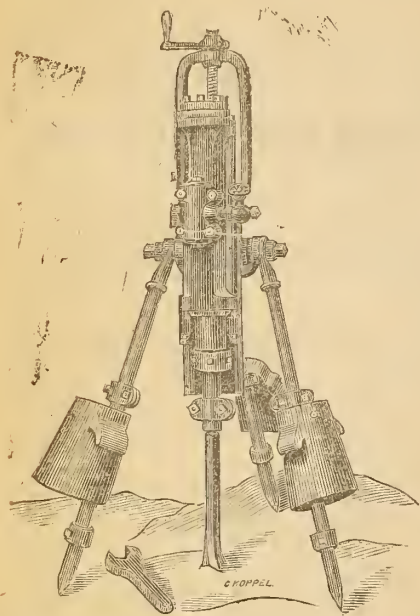
By order,

F. H. ENNIS,

Secretary.

Department of Public Works,
Ottawa, 8th Aug., 1884.

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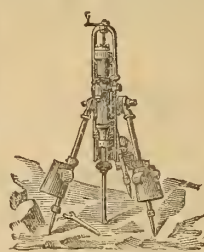
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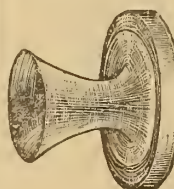
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CANADIAN

MINING REVIEW

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1884—OTTAWA, OCTOBER-NOVEMBER—1884

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UNION CHAMBERS, 14 Metcalfe Street.

The CANADIAN MINING REVIEW is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts as well as others interested in Canadian Mineral Lands are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 20th of the month.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

Beginning with the December number the CANADIAN MINING REVIEW will be published on the first of each month, and for that reason we issue this October-November edition.

The meeting in Canada of the British Association for the Advancement of Science will have no insignificant effect upon the future development of our mining industries. From Nova Scotia to British Columbia the mining sections were visited by some of the members of the Association, and many of the mines examined by scientific gentlemen, who, as geologists and mining engineers, have attained the highest positions in

their respective professions in England and on the continent of Europe. The universal opinion expressed by these gentlemen was to the effect that Canada had a great future before her as a mineral producing country. In the magnitude and variety of her mineral deposits nature has been liberal indeed, and this being the case it can be but a question of time when the necessary capital will find its way from the money centres of the world to aid in their development. The Nova Scotia gold mines; the gold and asbestos mines of Beauce, in the Province of Quebec; the copper mines of the Eastern Townships; the phosphate mines of Ottawa County; the iron mines of Eastern Ontario; the coal mines and extent of the coal beds in our easternmost and westernmost provinces; and the great variety of building stone available from one end to the other of the Dominion, quite surprised these learned men from the older world, and opened their eyes to the fact that outside of Canada our great natural resources have been, to a great extent, unheard of. The holding of the meeting of the Association for the Advancement of Science in Montreal will, therefore, afford us many advantages that, otherwise, could not, or might not have been procurable. The many letters that have appeared in the English press from the pens of these scientists, descriptive of what they saw, and repeating what they heard while they were visiting Canada, are evidences that they had been more than favourably impressed, and that their desire is that the world should know it.

In our next number we will publish a full and correct statement of the year's output of the Canadian phosphate mines, together with a statement showing to what ports it was consigned.

Mr. A. C. Lawson, employed on the staff of the Geological Survey of Canada, has completed his operations, for this season, in the Lake of the Woods District. He expresses the opinion that the section of the country examined by him during the past summer is rich in mineral.

The Phosphate Trade.

The shipping season for this year is closed and mine owners are now turning their attention to preparing for the winter's operations. Since phosphate mining was first started in this district the industry has never given such promise of rapid growth as it does to-day. The mines that have been in operation during the past few years are now supplied with machinery and other plant necessary to proceed with mining on a large scale and to the best advantage, and the mines are capable of yielding an annual output nearly double what has been produced, heretofore, in a single year. In addition to those mines that have already been developed there are many promising properties being opened and the outlook for a largely increased production is very encouraging.

The past season has seen many important changes at the mines, notably at "High Rock." Mr. Pickford, President of the Phosphate of Lime Company, of London, England, owners of this valuable property, has been at the mine for some time this autumn, where he has personally directed important reforms. Steam power was introduced at High Rock during the summer, and has, quite recently, been added to; a systematic principle has been laid down for future working, and with these addi-

tions and improvements Mr. Pickford is sanguine that, before the close of the shipping season of 1885, he will be able to mine and ship quite 10,000 tons of phosphate, or about double the past year's output of this mine.

No change of any importance has been made in the plant of the Union Phosphate Company, whose property was thoroughly equipped when work was started, about eighteen months ago. The development of this company's mines has been very satisfactory, and there should be nothing to hinder the manager from producing a largely increased output during the next twelve months.

The Dominion Phosphate Company's "North Star" mine continues to yield about 10 tons daily, and the phosphate, as we have frequently stated, is of a very high grade.

The "Little Rapids" mine has improved during the past few months more than any mine in the district, and in all the openings and shafts large bodies of bright green ore are exposed. Some new openings have been made within the past month that have uncovered very large beds of mineral. The deposits on this property have the appearance of fissure veins more than in any other section of the phosphate district, and the mineral has been followed to a greater depth than at any other phosphate mine in Canada.

At the "Emerald" mine another commodious boarding-house has been erected for the accommodation of the miners, and it is the intention of the manager to employ a largely increased force. As it only requires labour to produce mineral from this mine, it is to be expected that the output will be increased correspondingly with the extra force of miners employed.

At the "Lansdowne," adjoining the "Emerald," a great deal of dead work has been accomplished during the past six months, and the miners are now

working on mineral. The owners of this property, the Dominion Phosphate Company, are well pleased with the way it has developed, and are sanguine that it will yield abundantly when thoroughly opened up.

The Lièvre River Phosphate Company, incorporated in July last, are now engaged in active mining operations. At their "Battle Lake" mine, in Templeton, 23 men are employed, who are turning out a fair quantity of high grade phosphate, and at their "Prospect" mine, in Portland East, 9 men have begun to open up some promising deposits from which they extracted from the surface a ton a day per man; this average is, however, not likely to be maintained as they sink deeper.

The Templeton and Wakefield mines will continue to contribute their quota to the output of the County of Ottawa.

The complete returns of the year's shipments of phosphate from Ottawa County has not yet reached us, but we have no reason to think that 23,000 tons, the amount we mentioned as the probable total output, will be much astray. The Perth and Kingston districts have contributed about 2,000 tons additional.

Phosphate Quotations.

At this season of the year there is little or no movement in Canadian Phosphate abroad, and late sales are, therefore, not an indication of the general market. Our latest advices quote one shilling for seventy-five per cent. mineral with one-fifth of a penny rise.

Facilitating Transportation of Phosphate.

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Short Line Railway from Buckingham Village to C.P.Ry. Depot under Contract.

There has been an unaccountable delay in beginning work on the Little Rapids Lock, but the surveys have been made by the Engineers of the Department of Public Works, and the plans are completed. The Government have not, as yet, invited tenders for its construction, but it is not unlikely that this will be done shortly and that work will be begun on the lock before the close of the year. That it should be built is very important to the phosphate miners in the Lièvre district as it will enable them to float their mineral down the river in large vessels for transhipment to the

SHORT LINE RAILWAY

at its terminus at the landing, north of Buckingham Village, and thus connect with an all-rail route over the Canadian Pacific Railway from this point to Montreal. This branch railway will be built by the C.P.R. Company under its charter for the Northern Colonization Railway and the contract has been awarded to Mr. Thos. Raeside, who has already a force of men employed clearing the right-of-way, and it is expected that he will put a sufficient force to work at the grading to have the road-bed ready to receive the rails by the first week in December. This branch line will be a boon indeed to the phosphate men, and by the time the output will have begun to move in the winter the necessity of hauling their phosphate from Buckingham Village to the railway station will be a disadvantage of the past.

With the lock completed at the Little Rapids, and this short line railway constructed to the landing, the transportation of ore from the mines to Montreal, both in winter and summer, will be greatly facilitated.

A New Mining Company Organized.

A meeting of the shareholders of the Lièvre River Land and Phosphate Company (Limited), recently incorporated, was held at the company's office, No. 41 St. Francois Xavier Street, Montreal, on the 14th of October, and the following gentlemen were elected directors: Robert C. Adams, W. R. Elmenhorst, Wm. T. Costigan and Peter Lyall, of Montreal; Charles H. Trask, of New York; and A. F. Freeman, of Boston. At a subsequent meeting of the directors Robert C. Adams was elected President; W. R. Elmenhorst, Vice-President; Wm. T. Costigan, Treasurer; and J. Keith Reid, Secretary. As has been stated in a former issue of this journal, the L. R. L. & P. Company, limited, has acquired extensive areas of phosphate lands in Ottawa County, in the townships of Templeton, Portland west and Portland east. The company is now engaged in active mining operations.

THE MICA MINES

It is gratifying to hear the satisfactory reports that reach us almost daily from the mica mines that are in operation. The mines are improving with development in a marked degree, not only as concerns the increase in the quantity of mica obtainable, but the mineral in all cases has improved in quality as lower depths are reached. Near the surface the leaves of many of the crystals were discolored and thus impaired in market value; but it would seem that these defects almost entirely disappear at a depth beyond atmospheric influence. At one

mine in particular, where the mica was very generally discolored by oxide of iron, it is only in exceptional cases that crystals thus affected are now met with. In the township of Loughborough, Province of Ontario, a mine, producing mica of an amber shade, is being profitably worked, and from mines in North Burgess a quantity of excellent mica is being shipped each month. In the townships of Palmerston and Miller a fine quality of mica occurs but as yet the deposits are quite undeveloped. In the township of Villeneuve a very valuable mine is yielding mica in large quantity and in quality unexcelled on this continent: this mine, when more developed, will be a heavy producer, as the deposit is very extensive and the crystals well formed.

Asbestos Mining in Canada.

An article under the above heading appeared in the last number of this journal, and we are now in receipt of a communication, from a gentleman residing in the district where the industry is being so vigorously developed, requesting us to add the following facts: The Megantic mines have produced, up to Oct. 1st, one thousand tons of asbestos, the principal operators being—The

Boston Asbestos Packing Company, The Johnston Company, King Brothers, J. G. Ross, Senator and Wards, whose mines are in the township of Thetford; L. A. Senecal, Charles Lyonais and James Reed, in Coleraine; and the Chalmers Spence Company in the township of Broughton. The yield from all these mines has been most satisfactory to their owners, and the output has been disposed of at such prices as to leave a large margin of profit. The late discoveries on the property of Mr. Lyonais, in Coleraine, are said to be of much importance to mine owners in that section, and our correspondent adds that facilities for mining in Coleraine are all that can be desired, and that this township will, with the further development of its mines, contribute largely to the general output of this asbestos producing district. The mines have been visited during the season by a number of scientists and experts from Europe and the United States, all of whom were most favourably impressed. Strange to say that, up to the present time, no officer of the Geological Survey has visited these mines this year, and it is to be hoped that before the mining season closes some one of the staff will be sent through the district to collect complete information and to report progress in this important industry.

LAKE SUPERIOR MINES.

NEW DISCOVERIES REPORTED.

MINING OPERATIONS ACTIVE.

In an effort to boom the mines in Port Arthur District, the reports that have been circulated, respecting the richness and inexhaustible quantity of the ore that is being raised, sound like wild romance to the practical miner and the cool and collected, calculating capitalist. That the discoveries made during the past eighteen months are of much importance no one can question, and the result of the development work that has already been done, up to the present time, on some of the lodes, has been such as to warrant preparations for permanent mining operations; but any attempt to mislead the public by foolishly exaggerated reports will serve no good, practical purpose to the district, though it may be the means of putting money into the pockets of a few speculators.

The Rabbit Mountain Silver Mining Company are at work again on its location, and if the miners should be fortunate enough to work into a series of pockets of rich ore, such as the one that was first met with, the property must yield a handsome profit to its owners. From this one pocket, which occurred quite near the surface, the original proprietors of the mine extracted upwards of \$100,000 worth of silver, chiefly in the form of black silver nuggets, at small cost, and on which the reputation of the mine was established. We now hear that at the depth of 80 feet, in a drift, the miners have come upon another body of rich ore. The excitement of the moment has led people to circulate the report that this new pay-streak measures two feet in width and yields ore assaying 4,000 ounces of silver to the ton. This is certainly a wonderful strike, if report be true. Referring to the "Rabbit Mountain," the N.Y. *Mining Record*, in its issue of October 18th, remarks that "this Canada silver mine was referred to not many months ago, by one of the remarkable people who purvey editorial matter for the leading daily newspapers of this city (New York), as likely to increase the already too large output of silver in the United States." This property is now in the hands of men who are amply capable of providing all the facilities necessary to proceed with active operations to the best advantage, and with Captain John Tretheway, formerly of Silver Islet, as superintendent, there exists no reason why the mine should not, henceforth, be worked in a thoroughly mining-like and practical manner, and the public will, at all times, be pleased to hear sensible reports of satisfactory progress.

A new discovery of silver is now reported to have been made within seventeen miles of the "Rabbit Mountain Mine," which has been styled SILVER MOUNTAIN, and if the description of the location be correct it deserves the title, for we are told that in richness it excels the famous "Rabbit Mountain," and that the lode is sending forth nuggets of black silver weighing sixteen pounds and upwards, while the ore is streaked with silver, native and black.

It is also reported that yet another discovery has been made quite recently within easy distance, by rail, from Port Arthur, and that the ore assays upwards of \$80 in gold, over \$20 in silver, to the ton, and carries free gold.

It is also stated that native mercury has been found in the same district.

Summing up all the general information and actual facts that we have been able to gather from time to time, and from various sources, we cannot but be convinced that the Port Arthur District is destined to develop into one of the richest mining regions in the Dominion. Up to the present time, however, we do not hesitate to say that in our opinion the "Huronian Mine," though not quite so accessible as some of the others, is the most valuable mine that has yet been opened in the district, for the work that has already been accomplished on the lode has been sufficient to prove that, for many years to come, it can be, if carefully managed, a steady producer of ore carrying gold and silver in sufficient quantity to leave a large margin of profit to the shareholders. This company is well organized and controlled by steady-going, practical business men, who are offering no stock for sale and consequently are not desirous of *booming* the property.

NOVA SCOTIA MINING NOTES.

BLUENOSE GOLD MINING COMPANY.

This company, whose property is situated in the Montague district, opened a promising lead last fall, and erected an engine, pump, and other machinery necessary to thoroughly test it. The concentrating mill, which had been burned down, was rebuilt, and experiments were made with a set of Embrey concentrators which solved the problem as to the practicality of re-working Nova Scotia quartz tailings. The workings which have been re-opened by the Bluenose Company are on the site of the old De Wolf Mine, and, after nine months of unsuccessful prospecting and mining, they cleared out the old shaft, eighty feet deep, and sunk it thirty-five feet farther, but it is only within the last three months that paying leads have been worked. Of these there are three running parallel and nearly together, one about three inches, another six inches, and a third over eighteen inches wide. Another shaft has since been sunk, and is now about thirty feet deep, and in a third the lead has been struck a short distance from the second. The property is equipped with an eight-stamp mill and a regular series of attachments, quicksilver plates, etc. The *Bluenose* Mine was visited by a number of the members of the British Association for the Advancement of Science, when the lode was showing some handsome nuggets. They were much interested in the company's method of crushing the ore, and expressed themselves highly pleased with what they had seen.

COXHEATH COPPER MINING COMPANY.

At this mine, situated near Sidney, Cape Breton, a vein of good ore has been struck in the 190-foot level of shaft No. 2, and, together with the ore already in sight on the 140-foot level, the ability of the mine to permanently keep reduction works supplied with pay ore is considered settled. The company has adopted the same process for leaching all its ore under 6 per cent. copper as is in profitable use at the Tharsis and Mason & Barry mines in Spain, whose product, in the form of precipitate, is sent to the same market at Swansea, Wales, as the product of the Coxheath mine will be shipped to. The company proposes to erect leaching-works, and is in the market for funds. Up to September 1st, 1884, there had been expended in the enterprise \$141,564.13. July 1st, 1883, the company authorized the issue of \$100,000 first mortgage bonds, bearing 8 per cent. interest. Sixty thousand dollars of these bonds have been placed for cash at par, and the remaining \$40,000 are now to be placed. A stock bonus of 10 shares is to be given with each \$100 bond. Besides the accrued interest on the bonds from July 1st, 1884, the company claims to be able to produce copper at a profit with copper at even a lower price than the present.

BRITISH COLUMBIA MINING NOTES.

On Sunday morning, 12th Oct., an explosion of gas took place in No. 2 mine, Southfield, in that part of the mine known as the level, and which is being driven for the purpose of connecting No. 2 with No. 1 mine. From what can be gleaned it appears that on the morning in question David Morgan proceeded into the mine and down the slope as far as the entrance of the level, which is covered with a curtain,

when he sat down and awaited the arrival of the fireman, M. J. Price, who arrived shortly afterwards. The fireman was about lighting his safety lamp prior to testing the level for gas when from some cause or another the gas in the level took fire and exploded with considerable violence. Price, Morgan, Macfarland and a Chinaman were knocked down and severely hurt. Dr. Walkem, of East Wellington colliery, and Dr. Davis, Dr. Chinross' assistant, were sent for, by whom the wounds of the unfortunate men were dressed.

The Southfield Mine is a new mine started by the Vancouver Coal Company, about four miles to the south of Nanaimo.

News from the gold mines on Lorne Creek, Skeena River, is very encouraging. Mr. E. W. Washburn, who arrived at Victoria, B.C., from that district on the 16th instant, says that himself and a party of four took from their claim \$3,000 worth of gold in one month. Six or seven claims have been thoroughly worked, and all are doing well, from \$3,000 to \$7,000 being taken out of each claim during the past month. Mr. Washburn has exhibited some nuggets, to the value of \$250, which were coarse pure gold, showing that Lorne Creek is not as worthless as some people predicted it would be. Those claims that have not as yet been properly worked are not doing so well, but still the output is anything but discouraging.

The Indians are still in a troublesome state, but the miners fear no harm from them, as they, the miners, are well armed and prepared to maintain their rights. Mr. Washburn holds the opinion that Lorne Creek abounds in mineral wealth and that a great future is in store for the country thereabouts.

Advices to the *British Colonist*, from Lorne Creek, Skeena River, state that miners are doing well in that region. Forty or fifty men arrived from Victoria during the months of August and September, and a good deal of excitement is felt along the creek. One of the first locators writes that his claim is panning out about an ounce a day to the man. Other creeks in the same region look very favourable and the country will be thoroughly prospected.

For eighteen months the tunnel of the Burns Mountain Mining Company has been steadily progressing and when work was stopped had penetrated 820 feet into the mountain. The object of the tunnel was to strike what is known as the "Luck Cap" ledge from which, in former years, a large amount of gold is said to have been taken by means of a shaft sunk on the ledge for 45 feet, but the shaft had to be abandoned on account of water and the tunnel above referred to was undertaken. A survey just completed shows that the tunnel has reached the distance of the shaft at a depth of 170 feet below. The ledge is said to dip away from the tunnel at 18 feet per hundred, so that, at most, another 50 or 75 feet would decide the question. We would bespeak for this enterprise the attention of those of our fellow citizens interested in one of our great future industries—quartz mining—and wish the Burns Mountain Company that success which energy and perseverance commands.—*British Colonist*.

GOLD MINING IN BRITISH COLUMBIA.

A valuable paper on the Gold Mines of British Columbia was lately read by the Hon. H. Holbrook at Liverpool, his object being to draw attention to the gold mining industry, more especially, also, to the hydraulic gold washing resources, their great extent, and the profits derived from similar undertakings in California; to the quartz leads and their extent, and to gold mines generally. The chief want of the district is a white population to settle on the lands and white labour on the railroad works. Great advantages are offered to both, as well as to capital for the mining industry. The climate is good and corresponds with that of Kent. Railroad communication is rapidly extending, and British Columbia is now confederated with Canada. Upon the progress of the territory the author waxes eloquent; "The colony was first created by revocation of the crown grant to the Hudson Bay Company on the 3rd of November, 1858, succeeded by a proclamation issued by the Governor, Sir James Douglass, on the 19th November, 1858, providing for the Government of British Columbia, and declaring English law in force in the colony. From 1858, the progress of the country was brilliant, resembling the marvellous career of California and Australia after the discovery of gold in those countries. Thousands upon thousands flocked to these golden shores to improve their condition. The original deposits of gold, however, from which the shallow bars and benches of the Fraser River were fed, were not discovered then, nor indeed have they, in the opinion of many scientific men and experienced miners, been discovered yet. The mines on the Fraser were, therefore, soon exhausted; and being unable to sustain the multitudes flocking to them, were to a great extent deserted." Mining was begun on Fraser River at Hope, a place ninety-six miles from its mouth. The nature of the deposit and the character of the gold were invariably the same; that

is, the deposit was shallow and the metal light, or what is commonly called "float gold." Gold in paying quantities was found along the Quesnelle River. Roads were constructed into the interior at immense cost of time and money; and public works on a large scale were constructed and carried on. He describes the yield of gold from the mines as something wonderful. Up to 1862, he says, it is safe to say, there never could have been at any one time over 5,000 miners engaged (and the returns say only 4,000) in working the mines, and yet the annual yield was nearly £1,000,000, including, over the bank returns, the estimates of the gold taken away in private hands, a *per capita* average without parallel in the world. Taking the period from 1858 to 1882, he has prepared a table showing the actually known and estimated yield of gold, the number of miners employed, and average earnings per man:

YEAR.	Amount received by Banks and Private Hands.	Number miners employed.	Average earnings per man.
1858 } 6 months }	\$ 520,000	3,000	\$173
1859	1,615,072	4,000	403
1860	2,228,543	4,400	506
1861	2,666,118	4,200	634
1862 }	4,246,266	{ 4,100	517
1863 }		{ 4,400	482
1864	3,735,850	4,400	849
1865	3,491,205	4,294	813
1866	2,662,106	2,982	893
1867	2,480,868	3,044	814
1868	2,372,972	2,390	992
1869	1,774,978	2,369	749
1870	1,336,956	2,348	569
1871	1,799,440	2,450	734
1872	1,610,972	2,400	671
1873	1,305,749	2,300	567
1874	1,844,618	2,868	643
1875	2,474,904	2,024	1,222
1876	1,786,648	2,282	783
1877	1,608,182	1,960	820
1878	1,275,204	1,883	677
1879	1,290,058	2,124	607
1880	1,013,827	1,955	518
1881	1,046,737	1,898	551
1882	954,085	1,738	548
	\$47,141,711		

Williams Creek is estimated, in a territory of $2\frac{1}{2}$ miles, to have yielded five millions sterling. The Black Jack, in the Cariboo District, realized in two years £40,000, with an expenditure of £10,000; the Cunningham in four years gained £1,000,000, at a cost of £20,000; the California, the same; and the Steel Company gained £150,000 at an expense of about £50,000. All this, it should be borne in mind, was obtained without science or machinery, and with only the gold prospector's skill. On the Antler Creek, at a depth of less than five feet, men made from £10 to £50 a day regularly. What is now wanted is machinery, science and skill. It is also necessary to explore and thoroughly prospect the country for new diggings, or rediscover the old deposits in the surrounding hills.

NORTH-WEST COAL.

A very interesting article, entitled "King Coal," from the pen of Professor C. D. Wilber, formerly State Geologist of Illinois, has appeared in the *Chicago Mining Review*. Professor Wilber is personally known to us and has been a frequent visitor at our office. He bears the reputation of being one of the recognized authorities in the United States on coal; he is an able statistician and a powerful writer. During the past year he has directed some attention to the mineral resources of Canada and has carefully investigated the coal beds of our North-West Territories. After dwelling upon the development and distribution of coal in the Western and North-Western States and Territories, the sources of supply for the great agricultural areas destitute of coal, the relation of low coal rates on railroads to immigration and the recent discoveries of coal in Dakota, Wyoming and Colorado, he proceeds to speak of coal in the British possessions north of the 49th parallel, in terms as follows:—

"Taking our course north from Mexico, and comparing each political division or territory with the one south of it, we are certain to notice the

great preponderance of coal north of the 30th parallel. Large deposits of coal from 10 to 15 feet in thickness are found 400 and 500 miles north of Montana and Idaho. It is probable, however, that in the extreme north, bordering on the Arctic Ocean, we shall find a corresponding limit of coal, the cause of which is referable, as before stated, to the climatic conditions of vegetable growth.

"It will be interesting, especially to Canadians, to know the sources of coal for the vast region now intersected by the Canadian Pacific Railway. This area comprises the Provinces of Manitoba, Assiniboia, Alberta, and British Columbia. Here is an immense wilderness of both flat and rolling prairie, of grassy plains and magnificent rivers, having a soil both capable of husbandry and herding, as is proven to-day by thousands of new farms where so recently prevailed the wild and hopeless monotony of Nature.

"Into this unmeasured domain nearly 2,000 miles in length, east and west, by at least 500 in width, north of the 49th parallel—the international boundary—are coming, with the facilities of this new trans-continental railway, now being constructed by the Government, hundreds of thousands of the more hardy populations of northern latitudes—of Ontario, Quebec and Northern Europe, already accustomed to long winter terms.

"A colony of families from Iceland,' says a Winnipeg paper of recent date, 'have settled in Manitoba, and are so delighted with their new summer-land that they have sent greetings to their friends, with advice to come and possess the fertile acres of Manitoba, 'without money or price.' It is pleasant to anticipate them and their cousins, the Greenlanders, removing from the 75th to the 50th parallel, and rejoicing in the sunshine of a warmer climate, where even 40° below zero is to them a foretaste of ethereal mildness.

"Coal supplies for the eastern portion of this new region will come from the Souris River lignites already referred to. The middle region can be supplied from the Medicine Hat and Belly River coal districts which also afford lignites. The last named coals are inferior in quality, i.e., not compact, having a heavy per cent. of ash and moisture, and easily disintegrated in the open air. But notwithstanding they are the lowest order of cretaceous coals, yet the necessities of a six months' winter will compel their use and distribution by rail on an extensive scale.

"Beyond Calgary, which is destined to become the leading city of the North-West Territory, coal is found of a quality far superior to the lignite of the plains just referred to.

"A field of anthracite coal has recently been found near Cascade Mountain on the Canadian Pacific Railway 900 miles west of Winnipeg. It has been traced in a direct line, on its outcrops, for several miles, and at intervals pits or shafts have been dug to prove the regularity and persistence of this anthracite stratum. About 300 tons have been mined and shipped to the East, and from this amount, sufficient tests have been made, to prove not only its great value, but also its identity, as a true anthracite coal.

"In the Western States and Territories it is a universal fact that the grade of coals, in quality or value, increase towards the Rocky Mountains as follows:—

"1. We have loose or spongy lignites; 2. Compact or solid lignites; 3. Semi-bituminous; 4. Anthracite.

"A correct outline map of the productive coal limits of the Western States and Territories must be vague and uncertain especially on the south. Western Texas, New Mexico and Arizona should have areas indefinitely shaded with frequent doubtful signals—thus (?)

"But the coal area rapidly enlarges with every succeeding parallel going north. This area is over 200 miles wide in Southern Colorado. While in northern Colorado from Greely westward, across North Park to the coal fields of Utah in Great Salt Lake region, the width of the coal area is nearly 600 miles.

"Through Wyoming, beginning in the Black Hills Region, the coal area extends into Idaho, and includes several deposits of great size and value, notably one near Evanston on the Union Pacific Railway, having a thickness exceeding 40 feet; easily traceable several miles northward in the Bear River Valley. But, on the other hand, it is quite contrary to expectation, yet a fact, that the country nearly 900 miles west of Ogden, including both Nevada and California, is almost, if not quite destitute of coal.

"We find the greatest width of coal area is spanned by the 49th parallel, or the international boundary, reaching from the Souris River coal system to the Pacific coast, with considerable areas intervening that are destitute of coal, both in northern Idaho, Montana and Manitoba.

"North of this line we have already followed the route of the Canadian Pacific Railway, with results as above stated. Still further to the north-west, 200 miles north of Calgary, in the vicinity of Edmonton, are found large areas of excellent coal, exceeding 12 feet in thickness, extending thence west to the head waters of the Athabasca, and across again to the Pacific coast.

"So varied are the above described coal areas, in their quality, quantity and surroundings, that the man who reads the mute but sure

prophecies of nature can readily locate the future great centres of those industries that are based upon coal and iron."

In concluding his "King Coal" article, Prof. Wilber, worked up to a high pitch of enthusiasm by his review of long study and personal observation, finds expression for his feelings in the following words:—

"Based upon the facts that faithfully describe these resources of the Great West, undeveloped and unlimited, no speech can be considered extravagant that sets forth the possibilities of ultimate America.

"Even here is the grandest arena on earth for realizing the beautiful vision of the Apocalypse.

"And the City lieth four square, and the length of it is as large as the breadth. And he measured the city with a reed, 12,000 furlongs (or 1,500 miles square). And the nations of them which are saved shall walk in the light of it, and the kings of the earth do bring their glory and honor into it."

FOREIGN SOURCES OF LEAD PRODUCTION.

Numerous applications have reached us during the past few months, from people who are the owners of, or are interested in Galena deposits in various localities in the Dominion, for statistical information respecting the lead production in foreign countries, and as there appears to be a disposition on the part of these gentlemen to develop their galena deposits, we reprint, for their information, an interesting article which has recently appeared in the *New York Mining Record* bearing on the production of lead outside of the United States, as follows:—"Our production of lead, especially from argentiferous ores, is so steadily increasing in commercial importance that it becomes of immediate interest to our readers to have at least an approximate knowledge of the production of other countries, and especially of Great Britain, at once a considerable producer as well as importer of lead. According to the *London Mining World*, the total output of lead by the mines of the United Kingdom, for 1883, was 39,190 tons, of the aggregate value of \$2,527,000. This was a considerable falling off in the number of tons produced, as will be seen from the following statement of the quantity of lead produced in the United Kingdom for the ten years ending 1883, the quantities imported and exported and the amount left for home consumption:—

Year.	Produced from British ores. Tons.	Imp't and lead obtained from foreign ores. Tons.	British and foreign lead exported. Tons.	Available for home consumption. Tons.
1874.....	58,777	74,351	41,321	91,807
1875.....	57,435	89,705	38,624	108,516
1876.....	58,667	91,010	42,685	106,992
1877.....	61,403	105,472	47,785	118,990
1878.....	58,020	112,977	36,478	134,519
1879.....	51,635	117,014	36,776	131,873
1880.....	56,949	107,211	33,551	130,609
1881.....	48,587	106,593	43,109	112,071
1882.....	50,328	100,331	37,375	113,784
1883.....	39,190	118,521	59,287	118,424

Thus, the amount produced during 1883, was 11,138 tons short of the output of 1882, and 16,563 tons less than the average annual product for the preceding nine years. At the same time, however, the amount of lead imported or extracted from foreign land ores is 18,199 tons greater than for 1882, and 18,003 tons greater than the average yearly imports for the preceding nine years.

As for the exports of lead for 1883, they exceed those of 1882 by 1,912 tons, but were only somewhat greater than the yearly average exports for the preceding nine years, while the amount left available for consumption in the British Islands, only exceeding by 4,640 tons that for 1882, fell below the average yearly amount. The lead product in the ore treated was thus distributed as to sources, for 1883:

	Tons.	Cwts.
England and Wales.....	35,217	1
Scotland.....	3,613	12
Ireland.....	358	18
Total.....	39,189	11
Silver ounces.....		344,052

The highest price for English pig during 1883 was \$70 and the lowest \$59. The quantity of pig lead exported was 23,583 tons, the most of which went to China and Russia, but only 326 tons to the United States. The chief imports of lead ore into the United Kingdom during 1883, were from France, 2,763 tons; Spain, 2,906 tons; Italy, 5,386 tons and Peru 141 tons. For the last five years included in the

first table given above, we are able to give the chief quarters to which the lead was exported from the United Kingdom, namely:

	1879. Tons.	1880. Tons.	1881. Tons.	1883. Tons.
Russia.....	10,487	7,318	8,355	5,702
China.....	5,879	10,011	12,824	11,704
Australia.....	3,133	1,929	4,715	5,226
France.....	3,384	2,417	3,390	1,046
British India.....	3,282	2,589	3,349	3,116
Germany.....	1,171	1,069	1,041	1,236
United States.....	1,022	258	598	517
Other Countries....	8,418	7,966	8,837	8,468
Totals.....	36,776	33,551	43,109	37,375

But while, as appears in the foregoing, Germany has been importing yearly about 1,090 tons of lead from England during the four years ending with 1883, she has also been a heavy producer of lead, or to the understated extent:

	Tons.
1880.....	85,928
1881.....	86,729
1882.....	85,860
1883.....	94,930
Yearly average.....	88,361

The product for 1883 was not only larger than for any one of the four years, but 6,568 tons greater than the yearly average product for the four years. At the same time, there was a production of litharge to the understated extent:

	Tons.
1880.....	3,923
1881.....	4,514
1882.....	4,170
1883.....	5,044
Yearly average.....	4,413

As valued at the spot lead and litharge together, we have the following figures:

1880.....	\$6,310,213
1881.....	6,006,736
1882.....	6,207,040
1883.....	5,647,275

Thus we see, that although the production in 1883 was actually greater than that of 1880, by 9,000 tons, its money value was \$662,938 less, because of the fall, meanwhile, in the market price of lead.

But the largest foreign source of lead production and exportation in Spain, as may be seen from the following statement of her exports for the ten years and her estimated total product for the ten years ended with 1883:

	Exports tons of 2,240 lbs.	Estimated amount consumed at home.	Estimated product tons.
1874.....	84,384	10,210	94,600
1875.....	91,733	10,962	102,700
1876.....	98,705	11,790	110,000
1877.....	110,051	13,148	123,200
1878.....	88,068	10,432	98,500
1879.....	106,830	12,770	119,600
1880.....	92,399	10,901	103,300
1881.....	110,420	13,180	123,600
1882.....	116,132	12,868	130,000
1883.....	*123,000	14,000	137,000

In the absence of any present information as to the domestic consumption of lead in Spain and her colonies which must be material for a nation that has so considerable an army and navy† with large colonial possessions as Spain, and having a merchant marine of 2,236 vessels including 347 steamers in 1881, we have felt justified to add to the amount of lead exported every year a fraction under 12 per cent. to reach the total product of the lead mines of Spain, which rationally would seem rather under than over the product in view of the exports.

Now for the last four years the product of Great Britain, Spain and Germany has been, say as follows:

	Great Britain. tons.	Germany. tons.	Spain. tons.	Total tons.
1880.....	56,950	86,000	103,300	246,250
1881.....	48,600	86,800	123,600	259,000
1882.....	50,400	86,000	130,000	266,400
1883.....	39,230	95,000	137,000	271,250

During the last ten years the ancient silver-lead mines of Laurium, in Greece, have been contributing lead to the European supply and Italy has exported a good deal of lead ore doubtless included in the lead and ores embraced in the first of the foregoing tables of this article. As yet, we have found no data about either the production or the consumption of lead in France.

*For eleven months exports reported at 116,341, have estimated last month.

†124 steamships of war of all class s with 462 guns and an army of 90,000 men.

OUTLOOK FOR THE IRON TRADE.

The tone recently adopted by the leading authorities on iron and steel manufacturing in the United States points to the theory that this important industry has already begun to revive, and that the almost unprecedented stagnation which has characterized the iron trade during the past year is likely to be followed, in the near future, by a more encouraging condition of things. That the prospects are brightening is evidenced by the following article which has appeared in a recent number of the *Iron Trade Review*, of Cleveland, Ohio:

"Last week we printed a list of 26 iron concerns throughout the country at which reductions in wages, varying from 4 to 20 per cent., had been made on or about October 1. Like all pictures, however, there are two sides to this one as well, and this week we propose giving some facts on the more encouraging side. In the first place, we notice that the following works, which have been shut down for a longer or shorter period, have, within the past week, resumed work with full complements of men. The Fort Pitt Iron and Steel Works, Pittsburgh, employing several hundred hands; the Sharon Iron Co., of Sharon, Pa., employing several hundred men; Oliver Bros. & Phillips, Pittsburgh, 3,000 men; and Dilworth, Porter & Co., Pittsburgh, also a very large establishment. In the two latter instances, a notice of reduction of wages amounting to 12½ and 10 per cent. respectively, had been given, but was afterwards withdrawn. It is, of course, to be presumed that none of these works would have resumed had not the receipt of sufficient orders justified such action; and this surmise is borne out by the fact that several large contracts have been placed the past week with other parties, among which we may mention a \$4,000,000 contract with a Buffalo manufacturer for 50,000 tons of steel pipe; the sale of 13,000 tons of car wheel iron at Chattanooga, and a large sale of pig iron at Birmingham, Ala., at 50 cents advance on prices previously prevailing, coupled with the fact that every furnace in that region is expected to go into blast within the next four weeks. With such indications as these, business would not seem to be in the desperate straits that some would have us believe.

Calumet and Hecla.

It will be learned with surprise by those who, for many years, have been familiar with the phenomenal success of this world renowned copper mine, that the company has determined to pass the November quarterly dividend. The effect of this decision by the management must inevitably be a still further reduction in the market value of the

company's property. It will be remembered that no dividend was paid in May last, and but one half of the usual quarterly dividend was declared in August, the consequence of which was a rapid depreciation in value of the stock. At the close of 1883 the stock of *Calumet and Hecla* was quoted at 240 and in May, 1884, it had fallen to 170; in consequence of this latest decision of the management of the company, its stock sold down to 120 on October 20th. Where this downward course will stop is a matter for the future to decide.

Silver in the Selkirks.

It is reported that Dr. Dawson has examined and pronounced a favourable opinion on a quantity of specimens of silver ore brought into Calgary by Mr. Broderick and his party who went out prospecting in April last and have lately returned. He has taken up, it is reported, a number of claims, which are alleged to be situated about twenty-two miles south of the main line of the Canadian Pacific Railway.

A Marvellous Feat in Unloading.

What is said to be the greatest feat in unloading ever performed has been accomplished on the docks of the North Chicago Rolling Mill Co., at South Chicago. Work was begun at 6 o'clock a.m. on the steamer *Massachusetts*, and at 12 o'clock precisely her cargo of 1,618 gross tons, Ludington ore, was all on the dock. After an intermission of half an hour for dinner, the same gang went into the steamship *Merrimac*, and at 7 p.m. her cargo of 1,581 gross tons, Cleveland, ore was all out, and she was ready for her return trip. Allowing half an hour for supper, each boat was unloaded in six hours, making a total of 3,199 gross tons in 12 hours. This gives an average of 266½ tons per hour.

A ROMANCE IN MINING HISTORY.

Under the Spanish regime in Peru, as far back as 1660, one of the richest silver mines was that known as the Manto, owned by two Andalusian Spaniards, the brothers Jose and Gaspar Salcedo, and the mineral was found in large deposits of virgin silver which was sent directly to the Mint at Arequipa just as it came from the mine. Quite a large city, San Luis de Alva, soon grew up around the habitations of the Salcedos, to which resorted the wild, adventurous spirits from all quarters of Peru in quest of some share of the wonderful output of silver, whether by craft or force. Soon a feud broke out between the Andalusians and the Biscayans who had come to outnumber the former.

Bitter conflicts took place, and in one of these it is said, as many as a thousand men of the two parties were left on the field of battle. These incessant bloody disturbances finally provoked the Spanish Vice-Roy, Don Pedro, Fernandez y Andrade Conde de Lemos, to go to the scene with a considerable force in June, 1868. He burned San Luis de Alva to the ground and took away from it the title of City, which was transferred to the neighbouring village of San Juan Bautista, with the name San Carlos de Puno. Don Jose de Salcedo sought to placate the Vice-Roy by the present of the bars of silver with which he had paved the pathway from San Luis to his own house, for the Vice-Roy to walk upon, but while the silver was accepted, the unfortunate Salcedo was placed in irons. The same night there was affixed to the door of the lodgings of the Vice-Roy these words:—

Conde de Lemos	Count de Lemos.
Amainemos.	Abate your zeal.
O si no veremos.	Or if not we shall see.

This pasquin, so to speak, having been carried to the Vice-Roy, he wrote beneath it:—

Mataremos.	We shall kill.
Ahorcaremos.	We shall hang.
Después veremos.	Afterwards we shall see.

This was then reattached to the door, the chiefs of both parties were hung, and Don Jose de Salcedo was strangled at the mouth of his rich silver mine which was confiscated to the Crown of Spain.

The other brother, Don Gaspar, who meanwhile had fled to Spain, demanded restitution of the property and justice before the Council of the Indies, for the execution of Don Jose, by whose death he declared the Spanish Crown was a great loser, inasmuch as the mine when worked by them had paid to the King, in the preceding two years and a half, as much as \$1,774,000 as the Crown's share of the whole product of \$8,760,000. After seven years of solicitations he gained his suit and recovered possession of the property. But, meanwhile, all his fortune had been spent in Spain, the mine having been left unworked was filled with water, consequently, he was wholly unable to meet the heavy expense of reopening and working it. So he died in poverty after having been possessed of an enormous fortune. Subsequently, others were ruined in the effort to rid El Manto of the water, until it fell into possession of English parties who have managed to work it profitably again.—*N. Y. Mining Record*.

It has been stated that the Roberts' Iron Company, which has, for some years, been engaged in iron mining at Robertsville, Frontenac County, Ontario, has purchased an iron property in the Township of Bristol, County of Pontiac, Quebec, and has already begun mining operations. We will be pleased to receive more definite information on the subject.

General Mining Notes.

Fifty-six incorporated gold, silver, lead, copper and mica mining companies of the United States paid dividends this year, up to the close of September, aggregating \$7,171,797.

THE INTERCOLONIAL COAL MINING COMPANY (limited) paid a dividend on October 15th of seven per cent. on the preferred stock; and a dividend, in preferred stock (acquired), at the rate of four per cent. on the ordinary stock.

The mines of Guanajuato, Mexico, are estimated to have produced, since the year 1827, about \$260,000,000, coined in the same city, to say nothing of the unworked ore and bar silver exported; and from the time of the conquest to the present time the total amount is calculated at the enormous figure of \$900,000,000, of which the famous Valenciana mine, situated on the Veta Madre, has contributed about \$160,000,000.

EL CALLAO.—This celebrated Venezuelan gold mine produced 15,735 ounces of gold during July of this year, worth about \$270,000, and making a total product for seven months of 1884 of about \$2,175,000. The monthly dividend paid was \$5.50 per share, aggregating \$177,100. The product of this wonderful mine for the month of August was 15,594 ounces valued at \$307,000. The August dividend was \$5.60 per share, aggregating \$180,000.

THE COMSTOCK LODGE.—The work of delving into the bowels of the earth to the depth of 2,800, 3,100 and 3,200 feet is still continued on the Comstock. It is a conundrum as to what it is done for, as it has been demonstrated that the deeper this work is carried down the less prospect there is of developing a body of paying ore. Before the workings in the mine had gone below, say, the 1,700 foot level, it was a mooted question whether it would be possible that bonanza bodies of ore would be discovered at greater depths. Now, as the fact has been fully demonstrated by continuing the work, until the present lowest records have been attained, it seems that to continue to sink further is the height of folly, so far as any favourable results are concerned. It has been stated that the managers of the mines are doubtless of the same opinion, but that they are working in the interest of the "Gold Hill and Virginia Water Company," who supply water and ice, and also the railroads drawing a large business from the transportation of wood, timber and other supplies. However, as long as outsiders will continue to pay assessments the work will go bravely on. Thus writes an authority of Virginia City.



NOTICE TO CONTRACTORS.

SEALED TENDERS, addressed to the undersigned, and endorsed "Tender for Post Office, &c., Orangeville, Ont.," will be received until Thursday, the 23rd day of October next, inclusive, for the erection of

Post Office, &c.,

AT

ORANGEVILLE, ONT.

Plans and specifications can be seen at the Department of Public Works, Ottawa, and at the Post Office, Orangeville, on and after Monday, the 6th day of October next.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque made payable to the order of the Honorable the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party declines to enter into a contract when called upon to do so, or if he fails to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

By order,

F. H. ENNIS, Secretary.

Department of Public Works,
Ottawa, Sept. 5th, 1884.

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SEALED TENDERS addressed to the undersigned, and endorsed "Tender for Timber," will be received at this office until Monday, the 17th day of November next, inclusive, for the supply of timber required in connection with the Dredging Plant of the Department, according to a specification to be seen at the Department of Public Works, Ottawa, where printed forms of tender may be obtained.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque, made payable to the order of the Honorable the Minister of Public Works, for the sum of \$150, which will be forfeited if the party declines to enter into a contract when called upon to do so, or if he fails to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

By order,

F. H. ENNIS, Secretary.

Department of Public Works,
Ottawa, Oct. 28th, 1884.

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All particulars can be obtained from

B. & S. H. THOMPSON,
Montreal.



Notice to Contractors.

SEALED SEPARATE TENDERS (including plans and specifications), addressed to the undersigned and endorsed respectively: (1) Tender for Heating Apparatus, Three Rivers, P.Q., Post Office; (2) Tender for Heating Apparatus, Sherbrooke, P.Q., Post Office; and (3) Tender for Heating Apparatus, Cornwall, Ont., Post Office, will be received at this office until FRIDAY the 10th October next, for the completion of the above works.

Copies of plans of the buildings proposed to be heated and a memorandum of requirements will be furnished to those desiring to tender, who will be required to indicate the arrangement, &c., of their apparatus and furnish a fully detailed specification.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque, made payable to the order of the Honorable the Minister of Public Works, equal to 5 per cent. of the amount of the tender, which will be forfeited if the party declines to enter into a contract when called upon to do so, or if he fails to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

By order,

F. H. ENNIS, Secretary.

Department of Public Works,
Ottawa, 8th Sept., 1884.

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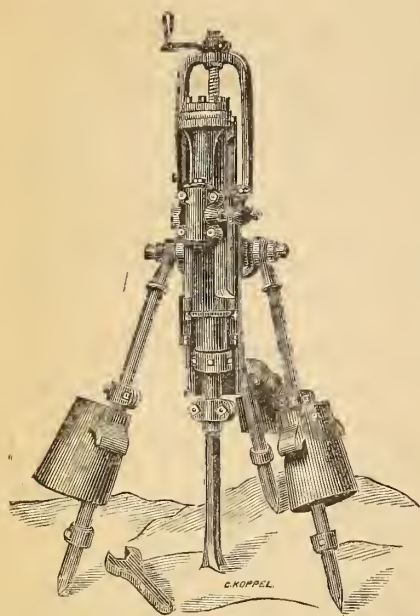
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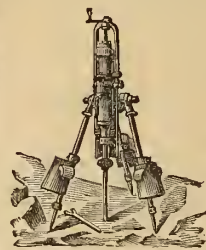
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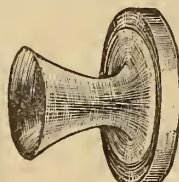
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UNION CHAMBERS, 14 Metcalfe Street.

The CANADIAN MINING REVIEW is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts as well as others interested in Canadian Mineral Lands are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 20th of the month.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

OUR attention has been called by a London, England, correspondent to numerous attempts that have been made during the past year to dispose of worthless mining properties to confiding English capitalists. It would appear that during last winter London was visited by certain speculators armed with bogus reports and false statistics concerning certain phosphate locations in the Perth district and in Ottawa County, and their method of offering these properties for sale on the London market was ingenious and well calculated to deceive the unwary. Skilfully executed maps of the country, where these imaginary phosphate mines were said to exist, were exhibited, accompanying which were most exaggerated and untruthful reports, signed by some audacious individual styling himself "Mining Engineer and Expert," setting forth the enormous value of the properties that were being offered for sale, and giving estimates of the cost of production and delivery from the mines to point of shipment. As a matter of fact these very

properties are known to be worthless, by those who are familiar with their location, and the figures given in the reports, as the cost of mining and transportation, are studiously cut down quite two-thirds, with a view to showing a fictitious margin of profit on an annual output which was represented absurdly in excess of anything that has yet been accomplished in this country. Neither pains nor expense was spared in preparing the maps, the plans of the mines and the reports, and had these people succeeded in accomplishing the object of their mission among English capitalists they would have been handsomely repaid for their trouble and outlay; but, so far as we can learn, the properties in question have not, as yet, changed hands. Such attempts, as the one we have just quoted, to bring our mining industries into disfavour, should be frowned down and exposed whenever they come to the knowledge of those who are interested in the future of Canadian mines. Capital is the one thing we are in need of for the development of our mineral resources, and it is our duty to prevent, so far as it lies within our power, its being invested in wildcat and bogus enterprises. The only way to encourage capital into the country is by guiding it at the outset into channels where it will be certain to find profitable investment. At once, when we have established a value for our mineral deposits and mines, ample capital is available for their development, but to induce capitalists, by misrepresentation, falsified statements and bogus reports, to invest money in Canadian mines, is to deal a death-blow to the country's enterprises. Such a calamity we will do all we can to avert.

It is, perhaps, a natural thing that the more successful a mining company is, the briefer becomes its annual or semi-annual reports. Shareholders, content with their profits, do not care for, nor do they need, elaborate explanations on technical points, says the *New York Engineering and Mining Journal*, and that this is strikingly shown in the case of the Callao mine, of

Venezuela, which can justly boast of being the most profitable gold mine in the world, now working. From 1871 to 1883, both inclusive, this mine produced from 169,955 tons of rock, 619,506 ounces of gold, valued at 59,648,821 bolivares or francs, out of which 20,447,000 bolivares of dividends were paid. The mine is now under technical management of American engineers, Mr. H. C. Perkins being superintendent, and Mr. Hamilton Smith, Jr., consulting engineer, whose reforms are beginning to tell handsomely in increased dividends. Working 3658 hours during the six months, the 60-stamp mill, the stamps dropping most of the time 65 times a minute, crushed 14,223 tons of rock, which, together with the product of some sulphurets and concentrates, produced 96,276 ounces of gold, valued at 9,269,311 bolivares, or roughly \$1,850,000, the dividend paid out of this product being 5,280,000 bolivares, or roughly \$1,050,000, equivalent to an annual net return of 32.8 per cent. on the nominal capital of 32,200,000 bolivares. Besides the dividends thus distributed, the company paid out 800,000 bolivares for the machinery for a new 40-stamp mill purchased in the United States, and now on the ground ready to be put up, and for sinking a new shaft, and 680,069 bolivares for the machinery of the Union mine. The result of operations at El Callao during the month of September, 1884, will be found reported in another column:

A SHORT-SIGHTED POLICY.

In the Kingston, Ontario, news items of 12th November we noticed that the County Council had on that day decided to memorialize the Government to legislate so that Canadian mines can be assessed beyond the assessment of the land. This would certainly be a short-sighted policy for any municipal corporation to pursue, as it is much more to the benefit of a municipality that mining industries should be fostered and encouraged in the immediate locality than that they should be thwarted and hampered by an imposed taxation, as any revenue derived therefrom would be a mere drop in the bucket as compared with the advantages to a community that are always to be had from the employment given and the money circulated by miners. In the phosphate districts of Ottawa County the

great benefit the mining industry has been to that section of the county is made apparent by the present easy circumstances of the farmers, among whom hundreds of thousands of dollars have circulated in payment for labour and farm produce during the past two years. They are now enabled to buy and sell for cash instead of dealing with the village storekeeper on the barter system as in former days when money was to them a curiosity. Any attempt to tax the mineral in our Canadian mines will be a mistake and should receive no encouragement from parliament.

THE PHOSPHATE TRADE.

The last shipment of phosphate for this season left Montreal on the 20th of November, for Liverpool, per s.s. *Ontario*. The total shipment for the season of 1884, from the port of Montreal, aggregated 21,243 gross tons, in addition to which it is estimated that 200 tons was sent into the United States and about 700 tons consumed in Canada, making a total, for the year's output, of 22,143 tons, 1,790 tons of which came from the mines in the Perth and Kingston districts, leaving 20,353 tons the product of Ottawa County as against 15,166 tons for the previous year.

Although the average price at which the past year's output has been disposed of was not by any means as high as it has been in former years, yet the season just closed has been one of marked prosperity to mine owners. The unprecedented continuance of wet weather beginning as it did early in October, caused the breaking up of the road from Buckingham Village to the railway depot, and the consequent discontinuance of the delivery of phosphate at point of shipment quite a month earlier than would have been necessary under ordinary circumstances; and this has been the means of reducing the total shipments from the Buckingham district quite 2,500 tons. At the *High Rock* mine alone 1,100 tons has been held over and at the Union Company's and the *Emerald* mines a large quantity of phosphate, which might have gone forward this season, has been held over owing to the impassable condition of the road from the landing to the railway depot. Had this hindrance not arisen the year's shipment from Ottawa County would have aggregated very nearly 23,000 tons, the amount estimated by the REVIEW, during the summer, as the probable output for 1884. In December, 1883, we predicted that Ottawa County would forward 21,000 tons during 1884, in which we were not far astray, as is shown by the following statement:—

PHOSPHATE SHIPMENTS FOR 1884.

The total quantity of phosphate shipped from Canada during the season of navigation of 1884, to foreign ports, is as follows:—

To Liverpool.....	8,557 gross tons
" London.....	4,389 "
" Glasgow.....	3,083 "
" Hamburg.....	2,970 "
" Bristol.....	1,824 "
" Dublin.....	210 "
" Penarth, for orders....	100 "
" Sunderland.....	60 "
" Bristol Channel.....	50 "
Total.....	21,243 "
Shipped to United States.....	200
Consumed in Canada.....	700 900
Total output shipped from the mines.....	22,143

Contributed by the mines in the Perth & Kingston district. 1,790 gross tons

Forwarded from Ottawa County mines.....	20,353 "
Total output for 1883.....	17,840 "
" " 1884.....	21,243 "
Increase for 1884.....	3,403 "

A NEW ENTERPRISE.

We understand that some of the owners of the pyrites mines at Capelton, in the Eastern Townships, have under consideration a proposal to erect sulphuric acid works in the phosphate region of the County of Ottawa, possibly at Buckingham Village, to which a branch of the Canadian Pacific Railway is now being built. As long ago as 1865, Professor Bell pointed out the advantages which might result from the establishment of such works if the apatite could be found in any part of the country in sufficient quantities to guarantee a permanent supply of the mineral. The developments in the valley of the Lièvre, having now removed all doubts on that head, we trust it may not be long before the proposed works go into operation. The government might very properly offer encouragement in some form to an enterprise so eminently calculated to benefit the mining and agricultural interests of the country.

THE C. P. R. BRANCH LINE AT BUCKINGHAM.

The phosphate miners of the du Lièvre district are to be congratulated on having, after a long and determined struggle, succeeded in inducing the Canadian Pacific Railway Company to construct a short branch road from the landing on the du Lièvre River, north of Buckingham village, to connect with the main line at Buckingham station. The distance is not more than three and a half miles between these points, but the waggon road leading from the village to the railway has been so systematically neglected by the township corporation that for many months in the year, especially in the spring and autumn, it is practically impassable. This has for some years been a serious drawback, and has added much to the expense of the transportation of phosphate from the mines to the point of shipment, so much so that this autumn hauling had to be suspended quite a month before the close of navigation, and shippers were thus prevented from availing themselves of a low rate of ocean freight for a large percentage of the season's output of the mines. This serious impediment to the phosphate industry is now removed, or will be before the close of the year. Mr. Rae field, the contractor for the construction of the branch line, has had a force of 200 men employed on the road-bed, and by the end of the first week in December the entire distance will be graded and ready to receive the ties and rails. By the 1st of January the line will be ballasted and opened for traffic. Mr. Rae field deserves credit for the energetic manner in which he is pushing this work towards completion, and the Canadian Pacific Railway Company, in providing this facility for the transportation of phosphate, has wisely considered its own interests as well as those of the mine owners of the Lièvre valley. The road will be a paying institution, and henceforth the transportation of phosphate will be made easy as compared with former years.

GRAPHITE.

The Deposits of the Ottawa Valley—Their Origin and Extent.

In referring to the deposits of graphite found in this section of the Dominion, known as the Ottawa Valley, it will not be going beyond the limits of the subject if, at the outset, we give a momentary glance at the formation and character of the rocks in which they occur.

The Archean era in geology includes the oldest rocks known to that science,—rocks which are supposed to have been formed from the original rocky crust produced by the cooling of the earth. They are easily seen to be the result of the disintegration of an older series, and frequently contain pebbles unlike any rocks now known.

In Canada, where these rocks are very fully represented, they are divided into two periods,—the Laurentian and the Huronian,—the latter being considered the oldest. The long chain of mountains, of which a portion is visible across the Ottawa, is composed of the Laurentian rocks, the estimated thickness of which is 30,000 feet, consisting, with few exceptions, of metamorphic, or crystalline rocks.

These rugged, broken hills contain mineral deposits of graphite, associated most frequently with the limestone. In this series of rocks there are three great limestone layers, separated by gneissoid rocks, aggregating not less than 3,500 feet in thickness. The limestone of each of these layers is often mixed with, or passes into rocks which consist largely of pyroxene, or hornblende, and those portions abound frequently with valuable minerals, among the most common of which is graphite.

As to the probable origin of graphite in these rocks, Dr. Dawson remarks that—"It may fairly be assumed that in the present world, and in those geological periods with whose organic remains we are more familiar than with those of the Laurentian, there is no other source of unoxidized carbon in rocks than that furnished by organic matter, and that this has obtained its carbon in all cases, in the first instance, from the deoxidation of carbonic acid by living plants. No other source of carbon can, I believe, be imagined in the Laurentian period."

When we come to consider the enormous deposits of carbon held by the Laurentian rocks, it will easily be seen that immense periods, even of a most prolific vegetation, must have been necessary for these formations. The atmosphere of that period must have contained a great amount of carbonic acid, and the seas been charged with abundance of carbonate of lime, and have contained, in common with the land surface, enormous expanses of vegetable life. The amount of carbon, in the form of graphite, in the Laurentian system is considered by Dr. Dawson to be equal that of equal areas in the Carboniferous.

In the Township of Buckingham a band of limestone, with some interstratified bands of gneiss, about six hundred feet in thickness occurs, and is filled to such an extent with veins, or disseminated crystals or scales of graphite that the mineral is estimated to constitute one-fourth of the whole in places, and allowing for the poverty of some portions, the total vertical thickness of pure graphite cannot be less than from 20 to 30 feet. It occurs in equal abundance at several other horizons in beds of limestone, estimated by Prof. Logan to have an aggregate thickness of 3,500 feet, and the total quantity thus contained can readily be seen to be enormous.

Unlike beds of coal, which occupy the place where the forests which produced them formerly flourished, graphite has been disseminated through the rocks by changes therein. In some places, to be sure, beds are found so regular and pure that they may fairly be compared to deposits of anthracite; but these are the exceptions, the great bulk of the mineral is scattered in scales, lumps, or thin veins. Many of these veins are mere shrinkage cracks traversing in countless numbers the containing rocks, and so in size as to often resemble strings of nodular masses.

The graphite contained in these is supposed to have flowed into them in the form of hydro-carbon; or it may have been in a state of agneous solution at an enormous heat. It is indirectly derived from the rocks traversed by the veins, and has deposited with it sediments from these beds. Hence there is no occurrence of fossils as in coal, and the vegetable origin of graphite can only be inferred from analogy, and from the fact of a few scanty organic remains, as those of Eozoon, having been found in the containing rocks.

Dr. Dawson sums up his argument in the following statements:—"First, that somewhat 'obscure traces of organic structure could be detected in the Laurentian graphite; secondly, that the general arrangement and microscopic structure of the substance corresponds with that of carbonaceous and bituminous matters in marine formations of more modern date; thirdly, that if the Laurentian graphite, has been derived from vegetable matter, it has only undergone a metamorphosis similar in kind to that which organic matter in metamorphosed formations of later ages has experienced; fourthly, that the association of graphite matter with organic limestones, beds of iron ore and metallic sulphides greatly strengthens the probability of its vegetable origin; fifthly, that when we consider the immense thickness and extent of the Eozoal and graphite limestones and iron ore deposits of the Laurentian, if we admit the organic origin of the limestone and graphite, we must be prepared to believe that the life of that early period, though it may have existed under low forms, was most copiously developed, and that it equalled, perhaps surpassed, in its results, in the way of geological accumulation, that of any subsequent period."

The graphite of the Buckingham district occurs in three distinct forms, always in, or in close proximity to bands of crystalline limestone, gneiss, pyroxine, or quartzite, and sometimes even in iron ores, as is the case at Hull; secondly, in distinct imbedded masses, or pockets in the limestones; thirdly, in veins traversing in every direction the containing rocks.

The first form is most common and occurs in greatest abundance in the limestones, often forming such large deposits as to possess great economic value, as at Buckingham.

The second form is also of common occurrence and has been worked in Buckingham and Lochaber, where the deposits are considerable. In the latter township the bed which has been opened is over ten feet in thickness and yields about 20 per cent. of pure material.

The last, or fissure graphite is not so common, and though of much greater purity and brightness cannot, in general, be worked to such profit.

It is said that plumbago was mined in a desultory fashion some thirty years ago in the vicinity of Grenville, and that the farmers around Buckingham were accustomed to use the purer specimens, which they picked up, for polishing their stoves. More recently, how-

ever, plumbago mining was engaged in by a New York company, the Dominion of Canada Plumbago Company, and the Montreal Mining Company, who carried on operations in the Townships of Lochaber, Buckingham and Templeton, respectively; but, through bad management, want of experience and a reckless expenditure of money, operations had to be suspended and the industry has not since been revived.

The Graphite obtained from the deposits of the Ottawa Valley is, from its purity and other qualities, eminently adapted to all the uses to which plumbago has been applied. Granular graphite, such as was formerly obtained in Cumberland, and has been mined in other European countries, is suited chiefly to the manufacture of pencils, and for stock where strength is not needed, but it is almost useless for crucibles; while the foliated graphite of Ceylon is used entirely for the latter purpose. The plumbago of this country, consisting as it does of both varieties, can be used for all the numerous forms in which this valuable mineral is employed.

ANALYSES OF CANADIAN AND CEYLON GRAPHITES.

LOCALITY.	Specific gravity.	Volatile matter.	Carbon.	Ash.
	Pr.ct.	Pr.ct.	Pr.ct.	Pr.ct.
Canada, Buckingham: vein graphite; variety, foliated	2.2689	0.178	99.675	0.147
Canada, Buckingham: vein graphite; variety, columnar	2.2679	0.594	97.626	1.780
Canada, Grenville: vein graphite; variety, foliated	2.2714	0.109	99.815	0.070
Canada, Grenville: vein graphite; variety, columnar	2.2659	0.108	99.757	0.135
Ceylon: vein graphite; variety, columnar	2.2671	0.158	99.792	0.050
Ceylon: vein graphite; variety, foliated	2.2664	0.108	99.678	0.213
Ceylon: vein graphite; variety, columnar	2.2546	0.900	98.817	0.283
Ceylon: vein graphite; variety, foliated	2.2484	0.301	99.284	0.415

These analyses prove the oft repeated claim that Canadian Graphite is equal to the best Ceylon.

The present commercial depression and the consequent diminished production of iron has caused a temporary decrease in the demand for plumbago crucibles for steel smelting, but appearances point to a decided revival of the iron industries, and when we know that one firm alone in England has been accustomed to use from 800 to 1,000 tons annually in the manufacture of crucibles, we may hope yet to see a resumption in plumbago mining in the Ottawa Valley. With the benefit of past experience, and the increased facilities for transportation, there exists no reason why this enterprise should not become a most important industry in the district if fostered and encouraged by capitalists and conducted under practical and economic management.

KINGSTON RED GRANITE.

The Red Granite property on the east side of the harbour at Kingston, which belonged to the estate of the late Hon. John Young, has lately been acquired by parties in Ottawa, who are about to work it on a considerable scale. The granite, which is of a good medium sized grain in point of crystalline texture, is sound and uniform and of a beautifully rich flesh or salmon-red colour. It rises to a height of 90 feet from the edge of the water in Deadman's Bay, the eastern arm of Kingston Harbour. The position offers unusual facilities for working the quarry and obtaining a reliable supply of labour for dressing the stone. Vessels employed in the grain trade, which are now obliged to return in

ballast, can carry the granite either in the rough or in finished blocks and paving stones to the western cities. At Kingston Mills, on the Grand Trunk Railway, within two or three miles of the quarry and connecting with it by sheltered navigable water, the falls of the Catarqui River offer an unlimited and never-failing water power which may be taken advantage of for sawing, turning and polishing the stone. It is expected that this granite will command a high price on account of its very pleasing colour and the fine polish of which it is susceptible. The opening of the quarry and works will be a boon to the old "Limestone City," which may hereafter become known as the *Granite City*.

OXFORD GOLD MINING COMPANY.

Lake Catcha District, Nova Scotia.

At the close of last year the President of this company presented his first annual report to the stockholders which showed that during the year the company had been able to pay dividends aggregating \$30,000 and to expend as well a large sum of money, out of profits, in machinery and other plant. We are now indebted to the company's secretary for a full and comprehensive report of the active continuance of mining operations during the year which is just closing. The company has during the year made some very important accessions to, and improvements of, its plant. Early in the year it was found necessary to have increased power for hoisting and pumping purposes, and also to use this power in the most advantageous and yet simple manner. The number of workings on the various lodes that would be required from time to time in the future, showed the necessity of electing either a system of independent machinery, more or less separated, or a system of concentration of power at the mill. Again if the latter were adopted, what method of power transmission would be the best. It was determined to concentrate the power all at the mill, and distribute it, as required, by means of wire rope transmission. To this end an additional engine and boiler was placed in the mill to act in conjunction with the engine and boiler already in use. This with two engines and boilers only the *destruction of the mill* could interfere with continuous work. Then on the main counter shaft, revolving 60 times a minute, was placed a 2 ft. bevel wheel that transmits the power to an upright shaft by means of a 1 ft. bevel wheel. On the upper end of this upright shaft (in the top floor of the mill) was attached several sheaves 7 ft. in diameter grooved to take a $\frac{7}{16}$ in. wire rope. These sheaves make 120 revolutions a minute. As they revolve in a horizontal plane it will be seen that the wire ropes leading on and off these sheaves can be made to carry the power in any direction of that plane. The wire ropes are supported on 1 ft. guide wheels to the place where power is to be utilized. Here is erected a frame of sufficient substantiality to carry a horizontal shaft $3\frac{5}{16}$ in. diameter; on this is a 45 in. bevel wheel connecting with a 9 in. pinion on an upright shaft, which latter again carries on its upper end a 7 ft. sheave similar to those in the mill and which receives the wire rope. From this gearing it will follow that the horizontal shaft revolves 24 times per minute. On one end of this latter shaft is a pump disc connected with the pump rod. On the middle of the shaft is a drum 10 ft. in diameter on which is wound the hoist rope. This drum is loose on the shaft; on one side of it is a friction wheel

on a feathered key that by means of a lever worked by the deck hand carries, when desired, the drum with it, thus hoisting at a speed of 240 ft. per minute. Such is a general description of the system of power transmission. The most notable feature is the use of horizontal sheaves. In the same way is the power carried to the pump at the lake, 500 ft. away, from where the water is brought to the mill for battery and boiler use. In the same manner power is transferred to the blacksmith shop where it runs the fan.

Also a tramway has been built leading from the principal workings up to the top floor of the mill where the ore breaker is. A car of the capacity of an ordinary cart is loaded at the mouth of the shaft directly from the hoist buckets and then pulled by a rope along this tramway up into the mill where it dumps automatically, descending again to the shaft by its own weight.

The additional engine and boiler necessitated the enlargement of the mill which was made in the shape of an annex.

The company has just built on the grounds for the superintendent a commodious and handsome house which is now occupied by him and the assistant superintendent.

The Provincial Government together with private subscription of mine owners has completed a road from Chezzetcook harbor to the mine and will probably extend it to Petpiswick harbor on the other side, thus supplying a much needed want of good and direct transportation.

A steam drill is now being put in operation on the Coleman lode that the superintendent reports will make a great saving in the cost of mining ore from that lode.

All these improvements, though lately curtailing to some extent the dividends, are now enabling the company to prosecute its mining work in the most satisfactory and economical manner.

The underground work has been confined principally to the mill and Coleman lodes. Since the annual report of the company, in December last, there has been mined and milled of the mill lode 398 tons, and of the Coleman lode 1,906; giving a result of 1,939 ounces of gold. The whole product of bullion to date (November) has netted the sum of \$103,943. From this has been paid \$36,000 in dividends to the stockholders.

GOLD MINING IN MARMORA.

For some time back the Gatling or Canada Consolidated Mine, which is under lease to Messrs. Stephens and Newberry, has been worked with a force of about 35 men, of whom a dozen or so are miners, the rest being underground labourers, mill and surface hands. The Deep Shaft is now down 135 feet, and the General Tuttle Shaft, to the south of it, 100 feet. From the Deep Shaft the levels run 340 feet south and 100 feet north, while from the other they extend through about an equal length on the vein, so that nearly 1,000 feet of ground have been proved. It is said that up to the 1st of June last, the gold actually obtained from this mine amounted to about \$10,000, and since that time to \$3,500 more. The difficulties in the way of extracting the gold from the obstinate arsenical ore of this mine are reported to be at last overcome, and with the stock of ore on hand and the large quantity in sight, there is a good prospect for the future.

MICA MINING.

This industry is likely to become one of much importance in Canada, owing to the many valuable discoveries of extensive deposits of mica of a good quality in various localities in the Provinces of Ontario and Quebec, and to the rapidly increasing demand for the mineral by stove manufacturers and for other purposes. For the benefit of those who have engaged in mica mining in Canada, we quote from an article which has appeared in the *Chicago Mining Review*, bearing on this industry in the State of North Carolina, as follows:—

"Just as surely as 55,000,000 people use more stoves than did half that number, so surely is mica of good pattern for the purposes of stove manufacture in far vaster and sharper demand than was that mineral fifteen years ago, when North Carolina first brought itself into notice as a mica bearing country. It is therefore not a very surprising fact that in the mica belt, 'cut glass,' as the product is called, to-day fetches rather more than five times the price it did when first marketed. Not only are more stoves made now than formerly, but the numbers in use are vastly increased, and they are of greater capacity and more ornamental than were those of any past period. Besides this, the mica plates of old, well used stoves often need renewing, as they get crushed or worn out by careless firemakers, so that from the stove industry of the United States alone a demand for clean, well cut mica, varying in size from 2 inches by 2 to 7 by 20, is constantly assured, a demand rising with the advent of every winter, and likely to continue as long as the nation itself. At the present day not less than 275,000 lbs. of the finished article are needed for the United States supply, and some of the finest quality is taken up for export."

Mica is found in North Carolina wherever the huronic slates (ponderous, non-lamellar shales) come in contact with, or are intersected by quartz, gneiss, granite, or feldspathic seams. These run almost invariably from northwest by north to southwest by south, and are clearly traceable for miles until the end of the highlands is reached, and the lower levels of North Carolina attained. Mica seams almost invariably dip at about 60°, and when lost or nipped out are usually sought for and refound by striking backwards through the north slate or boundary, or other solid containing rock.

The mines are of two sorts, soft mines, called locally "fluking," and rock mines, the distinction between them being that the soft mines exist where, from natural causes, the feldspar has become degraded, leaving the mica comparatively free and unbound; and hard mines are, as a matter of course, those where the surface mica was bounded by gneiss, which remains harsh and massive. The mica found in these latter mines is, as a rule, of better quality than that found in the fluking, but the soft mines are easy of access, and so long as no great depth is attained, requiring as they do no heavy driving and blasting, are workable by a few hands.

Fluking mines, however, when followed downward change to rock mines or give out altogether at from forty to sixty feet.

The best mines open at the present day are the *Clarissa*, 3¼ miles from Bakersville, Mitchell County and the *Ray* mine, in McDowell. It is said that "more mines than miners" is true of the mica industry in North Carolina and that there are but two instances on record of professional miners having engaged in this profitable branch. As a consequence unskilled labour has played the very deuce with the best mines and even the *Clarissa* and *Pisgah* mines, two of

the most famous in the district, are "hogged" to such an extent as to present rather the appearance of chance excavated pits than of regularly worked adits, shafts and drives. The *Clarissa* is, for this reason, to-day a monument of shameless want of foresight and ridiculous grasp-at-everything-in-sight-and-lose-the-future, greediness and ignorance. It is, in its deepest hole, nearly 340 feet deep, but has been so irregularly excavated that it cannot be pumped; so that now, when it should be paying cent per cent, it is abandoned, filled with water, an eyesore, and an unprofitable one at that. The driving of a single regular shaft to a proper well, at low water level, would have saved the mine to its owners, but they were too careless to prepare for the advent of water in quantities greater than could be hauled out with buckets on a rope. This mine just previous to its abandonment was running at \$100 per day, and yielding cent per cent.

In Mitchell county, where the best mica is found, but two mines at this time are in a marketable state. One of these is the *Pine Mountain* mine, a deep rock vein on the *Clarissa* lead, but fortunately for its owners nearly 900 feet higher than its water-logged neighbour. This is one of the most characteristic properties in the county. It was opened at the surface in February last by Colonel Borden, a miner of skill and experience, who was since shot dead, in a trespass trouble, by a party of opposing claimants to the *Hoppe A* and *Franklin* mines some 9 miles farther down the country.

At 25 feet Col. Borden got the lead open and found some 2,500 lbs. weight of rough mica, yielding 241 lbs. of fine glass. Then his death took place. This was on May 31st, and in June a splendid block of mica measuring 34 inches through was got out, then a horse of feldspar cut out the vein. This is invariably looked on as an occurrence of the best omen, and work was rapidly prosecuted with a double staff of hands. The feldspar was so hard that the work took thirteen steel to the foot in driving, and the blasting lasted for no less than thirty-five working days. The supporters of Colonel Borden, men who knew nothing of mining, and who had only entered upon the enterprise for relationship sake, soon got tired and actually quitted work, directing their local agent to sell out on the very day that the pay seam was again reached.

This mine, during the few days it was worked after the pay streak was regained, paid hugely.

As stated above 2,500 lbs. of solid mica yielded but 241 lbs. of merchantable, the causes for which are explained as follows:—The masses or lumps of mica have to be split into plates. These are sorted out into sizes and resplit into fine thin sheets, which in turn have to prescribe into regular patterns, mostly of an oblong shape and running at every variety of dimensions, from 2 inches by 2½ to 7x9 inches. In cutting off excess, shaping down the sheets to patterns, getting rid of spots, cracked, stained, and unsightly places, much waste occurs, and 10 per cent. is accounted a good yield from fine mica in the block.

This mica cutting is an industry in itself, requiring experience. It is mostly done by females at from 50 to 75 cents per day, and costs, as a rule, 13 cents per pound of prepared merchantable mica.

The other marketable mine is a "fluking" mine called "The New Sinkhole." It yielded \$6,000 worth of the product since its discovery in July last, and has been taken by a New York company at a long-lease (9 years) on a royalty. For the lease the New Yorkers paid a fee of \$12,000. They are making progress

but are likely to be obstructed by surface water, and possibly by difficulties in the way of timbering up soft clays, mostly Kaolin, through which their seam leads. The produce of mica is now not equal to the demand, and mines are getting scarcer and dearer.

Canadian mine owners will do well to see to it that their properties are properly opened and that mining operations are proceeded with in a systematic manner with a view to permanent work.

LAKE SUPERIOR MINES.

ACTIVITY AT THE RABBIT MOUNTAIN MINE.

RESUMING WORK AT THE TWIN CITY, AND THE BEAVER MINE TO BE OPENED.

The *Sentinel* informs us that Mr. H. H. Miller, Superintendent of the Twin City Mining Company, and Mr. Thos. A. Keefer, arrived in Port Arthur Saturday, 25th October, from Twin City Mine with the first load of high grade silver ore from that property. It is the intention of the company to make a consignment to the smelters before the close of navigation. Messrs. Miller and Keefer report considerable activity in the Rabbit Mountain Mine making things look happy and cheerful around there.

The new find at Silver Mountain is attracting a great deal of attention. The road is cut through to the new mine from the Twin City location, so that now there is direct communication from Port Arthur via the working mines in the Rabbit Mountain district. The Silver Mountain location is owned by Oliver Daunais, Capt. John and Richard Trethewey.

The Twin City Mining Company is organized and Mr. Miller, the Superintendent, has made arrangements to resume work on 96 T at once. The silver ore taken from this mine is as fine as from any in the district, and the prospects of the company are most encouraging.

The Beaver mine, on mining location 97 T, is another silver vein which is spoken of very highly. It is a strong vein, boldly cutting a mountain several hundred feet high. The vein and silver in its outcrops shows on both sides of the mountain. It will be an easy mine to work, like the Twin City, as the ore can be taken out without hoisting or pumping. Arrangements have been made to cut out a road to this mine and build cabins for the winter's work.

The roads are in a bad condition, although considerably improved by the late frost. When good sleighing comes, there will be more activity in the district.

THE IRON ORE DEPOSITS OF CENTRAL ONTARIO.

IMPORTANT DEVELOPMENTS THIS SEASON.

A correspondent of the *Iron Trade Review*, Cleveland, O., has written an interesting letter to that journal descriptive of a recent trip made by him over the line of the Central Ontario Railway and a visit to the iron mines owned by the Railway Company. This line of railway was completed last spring from the company's docks at Waller's Bay, on Lake Ontario, to the Coe Hill Iron Mine and the last rail laid on May 31st. The first cargo of iron ore went over the line on June 2nd, and the road was opened for passenger traffic on September 1st. The ore trains consist of 12 to 16 flat cars, each

carrying 15 to 17 tons of ore. The total quantity of ore shipped this season from the company's docks to Cleveland, O., up to the 20th October, amounted to 40,000 tons, of which 15,000 tons were mined during last winter, the balance, 25,000 tons, having been mined during the past summer. On that date about 2,600 tons remained on the stock pile at Coe Hill, and about 80 tons of ore was then being mined daily. This would seem to indicate that about 50,000 tons of ore would be shipped before the close of the season. After giving a description of the country traversed by the C. O. Railway, the railway itself, its grades and curves, etc., the *Review's* correspondent refers to what has been accomplished at the mines during the past season in the way of development, as follows:—

ORTON MINE.

This comparatively new development lies in Tudor Township, about two miles west of the main line of railroad. It probably presents the largest showing of any of the properties now being developed, being apparently about a mile in length. There is a very large surface exposure, but unfortunately the first specimens mined showed about 7 per cent. of titanium; otherwise the ore was found to be very pure. A diamond drill is at present in operation on this property, and it is claimed that specimens of ore taken from this same body, some 200' down, show no trace of titanium. This appears improbable, but it was the report made to the company last week, with further tests yet to be made. At the

EMILY AND ROBINSON MINE,

six miles north, a large surface opening has been made, though no definite results have been arrived at as yet. The outcroppings as shown at the Emily Mine are very large, but the vein has not yet been located. A diamond drill is at work here, and it is expected to do considerable work this winter by way of development. Analyses show from 68 to 69 per cent. of metallic iron. Considerable ore will probably be taken out this winter, preparatory to being shipped next spring over the branch road which is to be built.

BAKER MINE.

At this mine a number of test-pits have been sunk, showing a formation about three-quarters of a mile in length and in shape like a horse shoe. The surface ore shown is of good quality. This mine will probably be developed on an extensive scale next season. Nine and a half miles southwest of the northern terminus of the road is the

CHANDOS MINE.

Here a cut has been made across the vein showing a width of from 50' to 60' at the top. This vein is traceable for a half mile. The ore is, to all appearances, entirely free from sulphur. The prospectors have bored with a diamond drill to a depth of 260', going through two veins, one 40' the other 18' in width—all good Bessemer ore, analysing from 65 to 69 per cent. of metallic iron. A company to be known as the Arthur Mining Co. is now being incorporated to develop this vein, and work will be vigorously pushed next season.

There are two or three other developments in this range, but nothing has been done at them this season.

COE HILL MINE.

The most important work in developing the new region is in connection with the Coe Hill Mine, at the northern terminus of the railroad. Evidences of hard work and liberal expenditure

are to be seen on every hand. Coe Hill, a rocky eminence some 850' above Lake Ontario, has been transformed from a bleak and barren exposure, to a veritable hive of industry. Dumping chutes have been put up, tramways laid, a hoisting plant put in position, a town laid out, and boarding and dwelling houses erected. Twelve tenement houses are in process of erection, besides two large boarding houses. Upon the crown of the hill is the hoisting apparatus, consisting of a 350 H. P. engine built by the Globe Iron Works, of Cleveland; a battery of boilers made by the Weddell Foundry, of Trenton, and one of the well known hoisting drums of the Webster, Camp & Lane Machine Co., of Akron, O. Over this apparatus is to be erected a \$2,500 building 34x60', with an L 20x60'.

In the way of development the following work has been done: At the extreme east end of the works is Shaft No. 1, so numbered from its position, not because it is the oldest. In this shaft a depth of 40' has been reached, after going through 3' of soil, but no rock. A width of from 28' to 30' is shown in the ore vein, all of Bessemer magnetic quality, the needle showing a dip of from 95° to 100°.

Shaft No. 2 is down to a depth of 75', and a companion shaft has been sunk to a depth of 80'. These are to be connected by drifts. From present appearances, the rock seems to have been split, and the belief is that it is pinched out and that the two parallel veins will be found to come together below, with a combined width of 65' to 68'. Of course this is by no means demonstrated as yet, but the indications appear to point that way.

Shaft No. 3 is down about 85' showing the vein to be of continuous formation. On the surface the vein shows an average width of 50' to 60'.

Much work has also been done in stripping and in sinking test-pits, all of which show that the course of the vein is almost due east and west and with an ascertained length of 1,300'. The course of the vein, even from the surface, is quite distinct beyond Shaft No. 3. In digging for the foundations of the engine-house, a parallel vein was unexpectedly struck, compelling a change in location. An examination of these two veins would appear to carry out the idea of the proprietors that the rock is pinched out and that the two veins come together below. Opinions vary, however, as to whether their surmises are likely to prove correct.

A mistake has been made in opening up a considerable portion of the vein from the surface, instead of sinking shafts and drifting under, thereby leaving the workings exposed; but Capt. James, an experienced Lake Superior mine captain, has taken charge of the works and is now conducting the developments on more approved principles.

CANADA AS A COMPETITOR.

Concerning the future of these developments opinions vary with the predilections of the observer. Certainly the work of prospecting has been thorough, the showing of ore is flattering; the analyses are all that could be desired, and the arrangements made for getting the ore out and delivering it on board the vessels are complete and ample. The projectors of the enterprise are all skilled men-of-affairs, with plenty of capital and an abundance of energy. Whether the outcome of all this expenditure will meet their expectations remains yet to be seen. The indications point strongly to such a result; only opinions are offered to the contrary. As to the cost per ton at which these ores can be laid down on the docks in Cleveland, in competition with Lake Superior ores, the

following comparative estimate is submitted in each case taking the figures of the parties interested:—

	Canada	Lake Superior
Mining.....	\$ 1.00	\$ 2.00
Railroad freight.....	1.00	.45
Lake freight, tripping and unloading....	.94	1.10
Duty.....	.75	.....
Insurance.....	.03	.03
Total.....	\$ 3.72	\$ 3.58

This, of course, is putting the two regions on an equality in the matter of ownership and not allowing for any royalty. If this were taken into the account, it would probably be offset by the increasing cost of mining which will be experienced in Canadian mines as compressed air plant, pumps, &c., have to be added to their outfits.

BRITISH COLUMBIA MINING NOTES.

Many of the creeks emptying into the Skeena will be prospected in the spring.

This year has not been a prosperous one for the gold miners in Cassair district, the outputs being below the average of other seasons.

The output on Quartz Creek has been good, one man having taken out \$6,000. Others located on the creek have also done fairly well.

About twenty-five white and a number of Chinese miners have been engaged during the past season on Thibert Creek and have done fairly well.

Summing up the information which has come from the northern mines it would appear that the Lorne Creek diggings are paying from \$7 to \$10 a day per man and some new claims have been found on some of the adjacent creeks.

Conflicting reports come from Lorne Creek, while the total amount of gold mined may not be large quite a number of individuals have put together \$800 to \$1,400, the result of their season's work, which, in the light of the golden days of Cariboo, does not seem large though it is much better than empty pockets.

On Dcase Creek there have been five white miners and twenty Chinamen during the past season. One who has been in the Cassair district for the past ten years reports that little money has been made this season, though a few have done moderately well and one has done excellently.

The shipments of coal to foreign ports (exclusive of amount furnished foreign steamers at Victoria) from Nanaimo and Departure Bay for the month ending October 31st, amounted to 36,824 tons, valued at \$147,295. This is the largest foreign shipment for a single month in the annals of coal mining on Vancouver Island.—*Victoria British Colonist*.

Some prospectors who have been on Kitsini Kaline River report having struck diggings on that stream where they have taken as much as \$5 to the pan. Many of the miners think of going to this place in the spring, and, if the reports are found to be true, there will likely be a rush to that point. The river empties into the Skeena, but is got at from the Naas.

GENERAL MINING NOTES.

The deepest gold mine in the world is the Eureka, Nevada County, California.

Twenty thousand tons of Canadian iron ore had been shipped this season, up to the end of October, from Kingston, Ont., to Fairhaven and Cleveland.

The daily output of the Vancouver Coal Company, it is reported, has reached over 600 tons and with the assistance of the steam engine placed underground at the Esplanade shaft, the management anticipates raising the output, within a very short period, to 1,000 tons a day.

The Essex Gold Mine, Tangier district, Nova Scotia, has lately started up under a new organization and has made its first shipment of bullion. The old *Tupper* shaft has been cleaned out and shows a rich vein. The *nugget* lode maintains its reputation and the management is much pleased with results and prospects for future working.

The Ophir, Mexican and Union Consolidated Mining Companies have jointly sunk a winze 3,300 ft. into the bowels of the earth for exploration purposes, and it is still going down. It is said that if a much greater depth is reached it will puzzle the inventive genius to devise a steel wire that will be strong enough to carry its own weight.

The product of the famous CALUMET and HECLA for the four fiscal years ending 30th April, 1884, in copper 77½ per cent. fine, as also of ingot copper, has been as follows:—

1881.....	20,300.1147	1881.....	15,979.1300
1882.....	20,905.1187	1882.....	16,094.1985
1883.....	20,392.1480	1883.....	15,714.258
1884.....	22,956.155	1884.....	17,707.07

Letters patent have been issued by the Government of Ontario for the incorporation of the "Rabbit Mountain Mining Company of Ontario," with a capital stock of \$2,000,000 divided into 200,000 shares of \$10 each. The company will operate the Rabbit Mountain Silver Mine, and other mines on the north shore of Lake Superior, with its head office at Port Arthur.

EL CALLAO. This famous Venezuelan Gold Mine produced 14,102 ounces of gold during the month of September, 1884, remitted to the Messrs. Baring Brothers, of London. Estimated at the usual value of such gold per ounce, such produce was worth \$273,000. The dividend paid for the month was one of \$4.80 per share, aggregating \$154,560. The product this year to the close of September aggregated about \$2,775,000, of which shareholders have received \$40.80 per share.—*N.Y. Mining Record*.

A resident of Calgary, N. W. T., Mr. McRae, has returned to that town from British Columbia where he has located some valuable gold placers. He reports that a quantity of gold has been taken from the small tributaries to the Columbia River. From Canon Creek two men took \$200 in one week. Mr. McRae expresses the opinion that very rich placers are likely to be discovered next year. He has had a successful season in the district, but, on account of the snowslides, he has been compelled to suspend operations until next spring, by which time he will have had an opportunity to prepare for active mining on an extensive scale.

MINING HISTORY.

The history of British lead and silver mining reaches back into the realms of tradition. The mines at Combe Martin and Beer Alston, in Devonshire, are said to have enriched Edward the First and Edward the Second, and were re-opened by Queen Elizabeth, Combe Martin being discovered years before the reign of Henry the Seventh. The mines in the Mendip Hills were known in the reign of Edward the Fourth, a rude map, drawn about 1480, being still extant, together with a curious copy of the laws governing the district. The famous lead mines of the Alston Moor district, in Cumberland, had royal protection in 1233, and Richard the Second granted privileges to Nicholas Veteripont, which was confirmed to his son by Edward the Third. In 1620 the mines were reported exhausted; but in the eighteenth century they were re-opened. The Cardiganshire mines were certainly known in the time of Henry the Seventh. In 1690 they were "boomed" by the owners, and in 1698 the public was favoured with a highly coloured prospectus, which reads curiously like some of the modern documents of that kind. Thus, "with a stock of £20,000 and good management, the said mines would yield a yearly profit, over and above all charges, of £171,970 19s. 9d. for lead, besides the silver, which it is believed will yield, one ton with another, about £14 in silver per ton of metal, and may, in all probability, double the valuation of these mines." In 1700 the company was regularly formed under the title of "The Government and Company of Mine Adventurers in England." About 650 shareholders took the bait, embracing people of every class, but they never realized anything, and the mines which started with such brilliant prospects collapsed amid a flood of papers and pamphlets of accusations and vindications.—*Chicago Mining Review*.

THE METAL MARKET.

Messrs. E. W. Carling & Co., 16 Philpot Lane, London, Eng., report under recent date:—

Metals have shown a better tendency during the week, iron being generally in improved demand both for pig and manufactured sorts at hardening prices:—

IRON.—Scotch pig, @ £42 7½s. to £43 4½s. cash; Welsh bars, £5 10s. to £5 15s.; nail rods, £6 to £7; Hoops, £6 17s. 6d. to £7 10s.; sheets, £7 17s. to £9.

TIN.—Steady, dearer and in more demand @ £74 5s. to £74 15s.; for fine foreign Australian, £74 5s. to £74 15s.; English bars, £81 10s. to £82; plates I. C. coke, 14 x 20, £15; charcoal I. C., £18.

COPPER.—Firm, Chili bars good ordinary brands, cash, £53 10s. to £53 12s. 6d.; English tough ingot, £58; best selected, £59; sheets and rod, £64 to £65.

YELLOW METAL.—Sheets, 5½d.; sheeting, 5½d.

LEAD.—Steadier @ £11 to £11 5s., although little business passing; bars, £11 15s. to £12; patent shot, £13 15s.; sheet, £11 15s.; pipe, £12 7s. 6d.

ZINC.—Usual gauges, £18 5s. to £18 10s.

WIRE.—Fencing, rolled, No. 4, £6 15s. to £7; annealed drawn, No. 6, £8 5s.; No. 7, £8 5s.; as No. 8, No. 9, £8 15s.; No. 10, £9 5s.; galvanized drawn, Nos. 4, 6, £11 10s.

BRASS.—Wire, Nos. 1, 2, 6½d.; rolled brass, 6½d.; sheet, 6½d.

NAILS.—Wrought strong rose, 1½ to 3 in., 6d. to 8d., discount 40%; 3½ to 6 in., 35% discount; pointed, 30%; cut nails, £10 to £15 according to gauge.



NOTICE TO CONTRACTORS.

SEALED TENDERS addressed to the undersigned, and endorsed "Tender for Post Office Letter Box Fronts," will be received until Monday, 15th proximo, inclusive, for the supply of about 10,000 post office letter box fronts.

Parties disposed to submit tenders may obtain forms of tender, specification and any further particulars at this Department.

Parties tendering will be required to submit with their tender a sample of the box they are prepared to provide.

Tenders will not be considered unless made on the printed forms supplied, and signed with the actual signatures of the parties tendering.

The Department will not be bound to accept the lowest or any tender.

By order,
F. H. ENNIS,
Secretary.

Department of Public Works,
Ottawa, Nov. 17th, 1884.



NOTICE TO CONTRACTORS.

SEALED Separate Tenders (including plans and specifications), addressed to the undersigned, and endorsed, "Tender for heating apparatus, Port Hope, Ont.," will be received at this office until Friday, the 5th December next.

Copies of plans of the building proposed to be heated and a memorandum of requirements will be furnished to those desiring to tender, who will be required to indicate the arrangement, etc., of their apparatus and furnish a fully detailed specification.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque, made payable to the order of the Honorable the Minister of Public Works, equal to five per cent of the amount of the tender, which will be forfeited if the party decline to enter into a contract when called upon to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned. The Department will not be bound to accept the lowest or any tender.

By order,
F. H. ENNIS,
Secretary.

Department of Public Works,
Ottawa, 8th Nov., 1884.



Notice to Contractors.

SEALED Separate Tenders addressed to the undersigned, and endorsed "Tender for Heating Apparatus, Hamilton, Ont.," will be received at this office until Thursday, the 11th December next.

Plans and specification can be seen at this Department, and also at the Clerk of Works Office, New Public Building, Hamilton, on and after Thursday, 27th instant.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque, made payable to the order of the Honorable the Minister of Public Works, equal to five per cent of the amount of the tender, which will be forfeited if the party decline to enter into a contract when called upon to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

By order,
F. H. ENNIS,
Secretary.

Department of Public Works,
Ottawa, Nov. 24th, 1884.

GRAPHITE.

Wanted, fair average samples of about 1 lb. each, with prices, F.O.B. Address J. S. Merry, Assay Office, Swansea, Wales.

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RAILWAY CONTRACTORS

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All particulars can be obtained from

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Montreal.



NOTICE TO CONTRACTORS.

SEALED Tenders addressed to the undersigned, and endorsed "Tenders for Hydraulic Elevator, New Public Building, Hamilton," will be received at this office until SATURDAY, the 13th day of December next, inclusive, for the placing of a Hydraulic Passenger and Freight Elevator in the above building.

General conditions, form of Tender, and all necessary information can be obtained at this Department on and after Monday, the 22nd instant.

Tenders must be made on the printed forms supplied.

Each tender must be accompanied by an accepted bank cheque, made payable to the order of the Honorable the Minister of Public Works, equal to five per cent of the amount of the tender, which will be forfeited if the party declines to enter into a contract when called upon to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

By order,
F. H. ENNIS,
Secretary.

Department of Public Works,
Ottawa, Nov. 18th, 1884.

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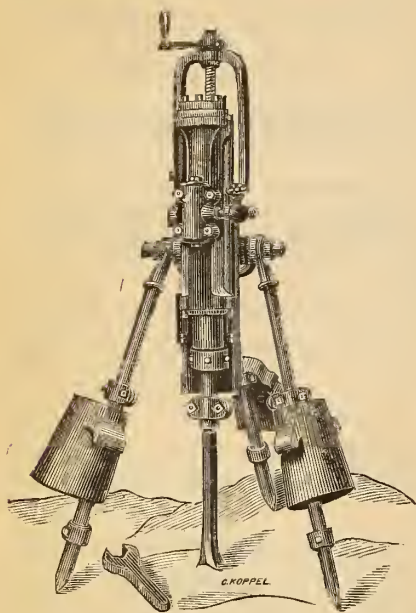
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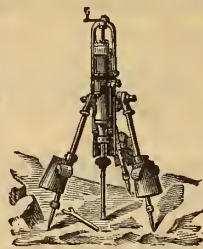
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Dear Sir:

Your name has been given to me as one intimately associated with prospecting. The "CANADIAN MINING JOURNAL" aims to be the organ of Canadian prospectors and is doing all within its power to further their interests, and wishes to make you a proposition.

During the past two years, the editor (who has himself been a prospector for years) has shaped the policy of the "Journal" with a view to providing the prospector with the information he requires in his search for minerals, and has tried to influence others to do likewise. He realizes that the prospector is the corner-stone of the mining edifice and has tried to convince others of this fact.

The "Journal" has gone farther than this. Finding that there was no suitable book for the instruction of prospectors it has made arrangements with Dr W. L. Goodwin, formerly head of the School of Mining, Queen's University, to write a book for prospectors. Thousands of prospectors in Ontario have attended Dr. Goodwin's lectures in the mining camps and know the value of this work. His book is just as good as his lectures.

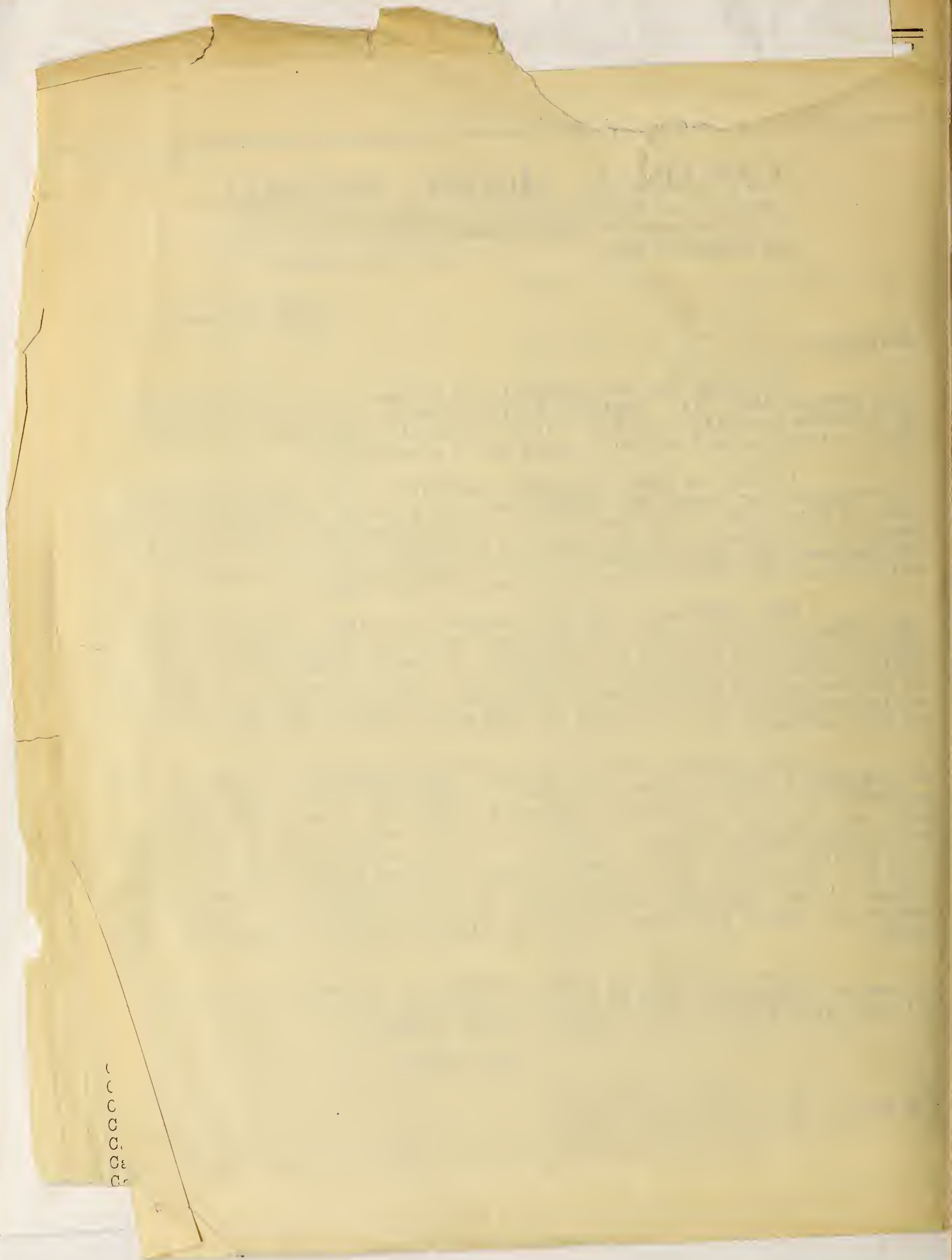
Our proposal is this: We know that Dr Goodwin's book, as well as the weekly issues of the "Journal", will help you in your work of prospecting, or if you are not actively engaged in prospecting, they will interest you vitally. We therefore offer you the book (Price \$3.00) and a subscription to the "Journal" for one year (Price \$5.00) for Five Dollars. Just fill in the enclosed form and mail it to me, and the book will be sent to you as soon as it is off the press. The weekly issues of the "Journal" will be sent on to you immediately. If for any reason you should be dissatisfied with either, we shall refund your money.

If at any time you have a problem we can assist in solving, or desire information that we are in a position to give or procure, do not hesitate to write the "CANADIAN MINING JOURNAL".

Yours truly.

W.M.G.-S.

Editor.



CANADIAN MINING REVIEW

VOL. 3.—No. 1.

1885—OTTAWA, FEBRUARY—1885

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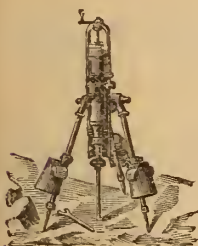
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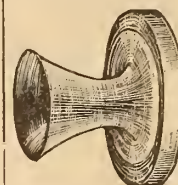
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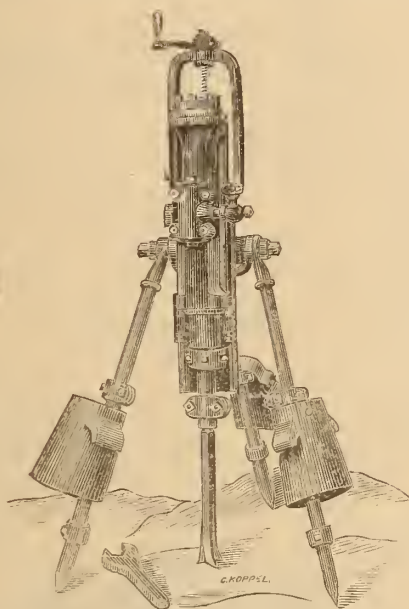
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We have been appointed Agents for the
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—\$ AND \$—

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In quantities as may be required.

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Suitable for use with the above.

Our **No. 1 Dynamite** contains **Seventy-**
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our **Patent Blasting Gelatine**, the
Strongest and Safest Explosive known, is
fully **Fifty per cent. stronger.**

The **Nobels Explosive Co.** have sent
to Canada, **Mr. Robert Bell**, one of their
practical instructors, who will, at any time,
be prepared to demonstrate the **Superi-**
ority of their **Explosives** over any other
offered, and to show how they should be used
to obtain the greatest effect.

We specially solicit orders, to import, at
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THE
MINING REVIEW,
—CHICAGO, ILLS.—
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NOTICE TO CONTRACTORS.

SEALED Separate Tenders (including plans and specifications), addressed to the undersigned, and endorsed "Tender for hot water heating apparatus, Brockville, Ont.," will be received at this office until MONDAY, the 16th proximo.

Plans, specifications, &c., can be seen at this office, and at the Clerk of Works' office, new Post Office building, Brockville, on and after Monday, 2nd proximo.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque, made payable to the order of the Honorable the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party decline to enter into a contract when called upon to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

By order,
A. GOBEIL,
Secretary.

Department of Public Works,
Ottawa, 29th Jan., 1885.

SITUATION WANTED.

A YOUNG CHEMIST, graduate of Germany, who speaks German, English and French, and who has worked at furnaces and steel works in Belgium and England for several years, desires a similar position in this country. The highest recommendations given.

Address,
FELIX BECKER,
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BELGIUM, EUROPE.



NOTICE TO CONTRACTORS.

SEALED Separate Tenders (including plans and specifications), addressed to the undersigned and endorsed "Tender for hot water heating apparatus, Kingston, Ont., Post Office," will be received at this office until MONDAY, 16th proximo.

Plans and specifications can be seen at the Department of Public Works, Ottawa, and at the office of Messrs. Power & Son, Architects, Kingston, on and after Wednesday, 25th instant.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque, made payable to the order of the Honorable the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party decline to enter into a contract when called on to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

By order,
A. GOBEIL,
Secretary.

Department of Public Works,
Ottawa, Jan. 24th, 1885.

PHOSPHATE CRYSTALS.

Farmers, Miners and Prospectors, having unbroken Phosphate Crystals for Sale, can find a cash purchaser by applying at the Office of

THE CANADIAN MINING REVIEW,
Union Chambers, 14 Metcalfe Street, Ottawa.

Parties offering crystals for sale will please mention the colour, length and diameter—large ones preferred.

MINING STOCK FOR SALE.

MR. R. C. W. MACQUAIG, Auctioneer, will offer by Auction, if not previously sold by Private Sale at his Office No. 45 Elgin Street Ottawa on Wednesday, 24th February, 1885, at one o'clock,

Twenty Shares of \$100.00 each fully paid and unassessable stock in the Ottawa Phosphate Mining Co., formerly known as the Emerald Mine, Buckingham.

TERMS CASH.—The fame of this Mine is fully established. It is yielding large results, and is considered the **Bonanza of Phosphate Deposits** by those who know.

Mr. McCuaig is open meanwhile to offers for the stock by Private Sale.



NOTICE.

TENDERS will be received by the undersigned until MONDAY, 16th February, prox., from parties desirous of leasing the privilege of ferrying across the River Ottawa, between Papineauville Wharf in the Township of St. Angelique, in the County of Ottawa, in the Province of Quebec, Dominion of Canada, and Brown's Wharf, in the Township of Plantagenet, County of Prescott, in the Province of Ontario, Dominion of Canada, in accordance with the terms and under the conditions set forth in the Regulations—copies of which can be procured at the Department of Inland Revenue, Ottawa, or from the Collector of Inland Revenue, at Ottawa.

Each tender must state the amount which the party tendering is willing to pay per annum for the privilege referred to, which amount will be payable in advance, the terms of the lease being for five years from the 1st May, 1885.

Each tender must be accompanied by a cheque marked "good" on one of the chartered banks, doing business at Ottawa, for one-half of the amount of the per annum tender. This amount will be credited on account of the first year's rent in the case of the accepted tender, and all other cheques will be returned except in the event of withdrawals, in which cases no refunds will be made.

All communications must be addressed to the undersigned and endorsed on the envelope "Tender for the Papineauville and Brown's Wharf Ferry."

E. MIALL,
Com. of Inland Revenue.
Department of Inland Revenue,
Ottawa, January 24th, 1885.

Mica for Sale.

ABOUT FOUR HUNDRED POUNDS

GOOD QUALITY, DARK MICA

has been consigned to us for sale. It is cut into sizes 2½x6 to 5x9 inches (the larger sizes predominating) and is offered at a very low price.

Also, ABOUT 2,500 LBS. OF SAME QUALITY IN THE ROUGH SLAB, OR CRYSTAL.

Apply at this office.

Cook Wanted

FOR A STEAM DREDGE on the St. Lawrence. A good Man Cook, for the season of 1885—beginning 1st April next.

Apply at this office.



TO ICE CONTRACTORS.

SEALED TENDERS, addressed to the undersigned, and endorsed "Tenders for Ice, Public Buildings, Ottawa, and Government House," will be received at this office until TUESDAY, the 17th February, for filling the ice house at the Old Military Store Building, Rideau Canal Locks, Ottawa, and that at Government House.

Tender to state price per block of the following dimensions, viz.: 3 ft. by 1 ft. by 1 ft., which price must include cost of packing and of the saw-dust required for that purpose.

The ice to be measured before being packed in the ice-house and payment to be made accordingly.

N.B.—The ice must be taken from the Ottawa River, above the Chaudiere Falls.

By order,
A. GOBEIL,
Secretary.

Department of Public Works,
Ottawa, 3rd February, 1885.



INTERNATIONAL AND COLONIAL EXHIBITIONS.

ANTWERP IN 1885—LONDON IN 1886.

It is the intention to have a Canadian representation at the International Exhibition at Antwerp, commencing in May, 1885, and also at the Colonial and Indian Exhibition in London in 1886.

The Government will defray the cost of freight in conveying Canadian Exhibits to Antwerp, and from Antwerp to London, and also of returning them to Canada in the event of their not being sold.

All Exhibits for Antwerp should be ready for shipment not later than the first week in March next. These Exhibitions, it is believed, will afford favourable opportunity for making known the natural capabilities, and manufacturing and industrial progress of the Dominion.

Circulars and forms containing more particular information may be obtained by letter (post free) addressed to the Department of Agriculture, Ottawa.

By order,
JOHN LOWE,
Secy., Dept. of Agric.
Department of Agriculture,
Ottawa, December, 19th, 1884.

Wanted.

A second-hand "Ingersoll" Rock Drill, three inch cylinder, with couplings, &c. Any person having one for sale will please communicate with the publishers of the CANADIAN MINING REVIEW.



PUBLIC NOTICE.

ALL persons, including Lessees of grazing lands, are hereby required to take notice that the cutting of timber on the public lands without authority from the Minister of the Interior, or the Local Crown Timber Agent of Dominion Lands for the District, is forbidden by law, and all timber so cut without authority is liable to seizure and to be dealt with as the Minister of the Interior may direct.

Each settler on a homestead quarter section not having timber on it, may, on application to the Local Agent of Dominion Lands, purchase a wood lot not exceeding twenty acres in extent, at five dollars per acre.

Any person, other than a homestead settler desiring permission to cut timber, must make application therefor to the Minister of the Interior, who will deal with such application according to law.

Persons who have already cut timber without authority, must pay the dues thereon to the Crown Timber Agent at his office, on or before the 1st of May, 1885; otherwise the said timber will be confiscated under the provisions of the Dominion Lands Act.

(Signed),
A. M. BURGESS,
Deputy of the
Minister of the Interior

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People having Mines and Mineral Lands for sale can reach Capitalists, and Capitalists can find profitable investment for their money, by advertising in the columns of

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Further information obtainable by addressing the Publishers, or at the Office, of the

CANADIAN MINING REVIEW.

Union Chambers, 14 Metcalfe St.,
OTTAWA.

Canadian Mining Review.

OTTAWA.

PUBLISHED MONTHLY.

ANNUAL SUBSCRIPTION - - - - \$1.00

ADVERTISING RATES—15c. per line (12 lines to 1 inch).

OFFICE:

UNION CHAMBERS, 14 Metcalfe Street.

The CANADIAN MINING REVIEW is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts as well as others interested in Canadian Mineral Lands are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 20th of the month.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

The intention of the Commissioner of Crown Lands for the Province of Quebec to cancel the sale of certain lands in the County of Ottawa, public notice of which has appeared in the Quebec Official Gazette, has elicited much correspondence on the subject from parties who consider themselves aggrieved by the action of the Government in cancelling the sale of a number of lots within the phosphate belt, owing to the settlement duties not having been performed in compliance with the regulations of the Crown Lands Department, said lots having, meanwhile, fallen into the hands of other parties who had purchased the settlers' rights in good faith. So far as we can judge from the correspondence which has appeared in public print, directed at the Commissioner of Crown lands, and the Hon. Mr. Lynch's replies to the same, we must, in fairness to the Commissioner, say that, in our opinion, he has vindicated the Government in so far as its actions relate to the cases which have been brought to his notice.

There are, however, instances which we could cite where settlers, who had taken up locations, and had made payments to the Government on account of same, had afterwards discovered it to be practicably impossible to cultivate a farm of sufficient extent to yield them a living on the lots they had selected, nine-tenths of the area being bare rock. In some cases, such as these, deposits of phosphate were discovered on the locations, and the settlers transferred their claims to miners for certain considerations.

The Government at Quebec accepted the transfers, together with the balance of the money due, and in so doing become a party to a contract which, according to Justice Macdougall's judgment in the case of Holland Bros., could not be violated, and the power to cancel was no longer vested in the Commissioner of Crown Lands.

In such cases as we refer to the hardship is not with the settler, but with the miner, whose interests it is our duty to protect as far as it lies within our power. It is a somewhat remarkable fact that all the lots in certain townships which have reverted to the Government, through cancellation of sale by order of the Commissioner of Crown Lands, are those upon which phosphate deposits have been discovered, and where improvements for agricultural purposes could not reasonably be expected; yet the neglect of the settler to make the improvements in strict conformity to the regulations, has been the plea for cancellation. The lots, so cancelled, have in nearly every instance been re-sold by the Government as phosphate lots, some at private sale, and others at public auction. The Commissioner of Crown Lands may not be personally cognizant of it, but it is nevertheless true that, in almost every instance, where properties have been acquired in this manner, they have fallen into the hands of speculators—the very thing he claims it is the desire of the Government to guard against. The term speculator we infer to apply to individuals who acquire phosphate lands from the Government, and hold them in an undeveloped state until such time as the more enterprising class (the miners), by working their mines and developing deposits in the district, will have enhanced the value of the lands acquired for speculative purposes. If the Government of the Province of Quebec desires to develop the phosphate industry in the county of Ottawa, and in other parts of the province, it would be a wise policy to encourage the enterprising miners, who have already done so much towards opening up the mineral resources, and, by so doing, making heretofore worthless lands of great value to the Government. Where patronage or favour can be bestowed, those who have advanced the mining industry by engaging in active operations have the first claim to it. Mining is acknowledged by everyone to be speculative, but active mining men are not speculators in the sense the term has been applied in the discussion which has arisen out of the late decision of the Commissioner as expressed in the notice in the Gazette above referred to.

By REFERENCE to an advertisement in this issue, for miners in Nova Scotia for the Oxford and the Essex Gold Mining Companies, it appears that the supply of mining labor in that Province is not equal to the demand there. We understand that mining labor is quite uncertain owing, to a great extent, to the fact that a large number of the miners are also fishermen, and during the fishing season desert the mines to take their chances on the water. Also, the supply of labor does not keep pace with mining development. At present the following Gold Districts exhibit a very active appearance: Lake-Catcha, Carribou, Darr's Hill, Tangier, Lunenburg, Stormont, Montagu, Fifteen Mile Stream, and the Rawdon District; the latter only now opening up.

TWENTY shares of the stock of the Ottawa Phosphate Company are offered for sale, as will be seen by reference to another column. If not disposed of at private sale before the 24th of February, they will be sold at auction on that day by Mr. R. C. W. MacCuaig, at his office on Elgin St.

DR. G. T. ORTON, M.P., who has resided for some time past in Manitoba, is giving much attention to the mineral resources of that province and the North-West Territories. Being the medical attendant to the Canadian Pacific Railway employees, he has occasion to make repeated trips to the Rockies, and has thus been afforded facilities for collecting information concerning the mineral resources of the North-West that must prove valuable to him. Dr. Orton is already interested in several mining enterprises in that locality, and it is to be hoped that his investments have been judiciously made.

The New York mining stock and National Petroleum Exchange has decided to deal in railway securities of all descriptions—bonds as well as stock. This decision has been arrived at on account of the Stock Exchange having departed from the terms of an agreement by which it was bound not to deal in other mining stock than those that were "listed" at the time the agreement was entered into. The public will, by this new departure of the Mining Stock Exchange, be enabled to buy or sell or hold railway securities with so small a unit for transaction as *ten shares*, or \$1,000 par, which is the same as 1,000 barrels of oil, the unit for dealings in petroleum.

The number of new mining companies registered in England in 1884 were 148, with a nominal capital of £14,952,207, as compared with 151 in 1883, with £14,712,398 capital.

The largest emerald in the world has been found in the celebrated Muzo Emerald Mines, in the State of Boyaca, United States of Columbia. The largest specimen of the gem, heretofore known to lapidaries, is in the collection of the Duke of Devonshire, and weighs between eight and nine ounces—it came from a mine in the same neighbourhood.

OUR PHOSPHATE INDUSTRY.

Another year has opened in the history of phosphate mining in Ottawa County, and the present appearance of the mines leads to the conviction that a much larger quantity of mineral will go forward during the shipping season of 1885 than was shipped last year. The mines which have been the chief contributors to the general output of recent years are better equipped, and are showing more mineral now than at any former period, and those two facts are sufficient reasons why we should expect an increased annual production. Nothing has tended to stimulate this important industry so much as the investment of foreign capital and the organization of powerful companies composed of men of practical business ability, of intelligence and of means. This combination of three important qualifications has been the means of overcoming difficulties by which the smaller operators in the early history of phosphate mining were beset, and which rendered the industry unprofitable to many of them. One by one these hindrances have been removed by the introduction of steam power, modern machinery and increased facilities for transporting the product of the mines. The study of economy in the business management of every branch of the industry, and the recognized necessity of shipping the mineral in a high state of purity, are rapidly having the effect of placing the phosphate mining industry of Canada on a sound and permanent commercial basis; and now that our mine owners have succeeded in establishing an indisputable value for their properties, and by the judicious investment of capital have placed themselves in a position to supply a large annual demand, they find themselves face to face with a serious problem, and one that is of vital importance, viz.: What is the most advantageous means of reaching the consumer? From the inception of phosphate mining in Canada up to the present time, producers have been very lax on this point, and have left themselves at the mercy of middle-men in Montreal and abroad. The profits derived from their operations have been so largely in excess of those obtained from any ordinary investment that they were willing to accept the result, without criticising how it came about, and to leave the employed agent with unrestricted control of their interests. The inexpediency of such a course has naturally been suggested to the stricter business men who have invested their capital in this enterprise, and who are watchful of every minutiae connected with its management. A more careful scrutiny during the shipping season of 1884, of transactions between principles and agents, has brought to light gross irregularities, redounding to the disadvantage of the former, and swelling the coffers of the latter by amounts in comparison with which the legitimate commissions are insignificant; and this will always be an insuperable drawback to the success of our phosphate mining industry, until mine owners have been induced to co-operate and agree upon a system of purchase and sale that will afford them proper protection. The establishing of a central assay and shipping office in Montreal, and appointing a trustworthy receiving agent in each of the principal cities abroad, where Canadian phosphate is most in demand, to whom shipments could be assigned, would be

the most economical means of insuring full value to producers for the output of their mines, and we venture to predict that some such reform will be adopted in the near future.

THE MINES.

High Rock Mine.—This valuable property is owned by the Phosphate of Lime Company, whose head office is in London, England, and has been the most productive phosphate mine in Canada. Since it fell into the hands of its present owners not less than 20,000 tons of high grade mineral has been its production, and notwithstanding the fact that \$32,500 was the price paid for the land now owned by the company, apart from the cost of the machinery and plant, with which the mine is equipped, the profits of the past three years' operations have been sufficient to recoup the shareholders all their outlay, and to admit of a dividend being declared at the close of last year of twenty-five per cent. on the capital stock, besides which \$10,000 was set apart as reserve. This mine is in excellent shape now for producing mineral, and to judge from the quantity that has been raised during the past year, it is not unlikely that its output will reach 7,000 tons for shipment this year, being 2,000 in excess of any former year's production.

Star Hill Mine.—The Union Phosphate Co. has every reason to be satisfied with the result of last year's operations at its mine, known as Star Hill, but the developments that have been made on this property, and the increased facilities afforded for handling ore, will enable this company to largely increase the output this year over that of 1884. At this mine, as well as at High Rock, the boarding-house accommodation has been extended during the past twelve months, and is sufficient now to provide for the employment of as large a force of miners as can advantageously be employed on the ground that has been opened. The Union Company has ample territory, rich in phosphate, to warrant extensive preparation for vigorous mining for many years to come.

North Star Mine.—The present condition of this mine should be highly gratifying to its owners, the Dominion Phosphate Company, who have adopted a system of mining which is thoroughly proving the value of the property. The manager, Mr. W. H. Smith, acting under instruction of the directors, has been engaged for some time past in sinking a shaft in the centre of the location, without reference to the mineral in sight, to practically test the depth to which the phosphate deposits extend, in that particular locality, in paying quantity. Acting under these instructions Mr. Smith caused a shaft to be started at a point where a small string of mineral, about three inches wide, appeared on the surface. At a depth of 100 feet this small exposure has increased five feet in width, and now extends from end to end of the bottom of the shaft. At this level drifting will be commenced and a large and steady output may be looked for. This affords one more positive proof that the phosphate deposits increase in volume as lower depth is attained, and that the mineral improves in point of purity. The Dominion Company has now upwards of 2,000 tons raised, a portion of which has already been forwarded to the bank of the Riviere du Lievre for shipment when navigation opens.

Little Rapids Mine.—The developments of this mine during the past few months have proved it to be one of the most valuable properties in the entire phosphate region. It has been visited by such men as Prof. W. Boyd

Dawkins, of Manchester, England; Prof. G. A. Kinalhan, of the Geological Survey of Ireland; Dr. T. Sterry Hunt, of Montreal, and by the majority of the practical miners in the phosphate district, all of whom have been most pronounced in expressing the opinion that this mine is one of great value. At no other phosphate mine in Canada have such well defined veins of mineral been met with, nor has the phosphate been followed elsewhere to such a depth as at the Little Rapids. The quality of the mineral is of the highest grade and is brought up to a standard of 85 per cent. by hand cobbing. Its convenient situation to the river and proximity to railway communication is also greatly in its favour. The mine is well equipped with suitable machinery and comfortable buildings of a substantial character have been erected on the property. A large quantity of excellent mineral is now being raised.

Mr. W. A. Allan, of Ottawa, owner of the Little Rapids Mine, purchased the adjoining property about a year ago, and is now opening it up. It is the continuation of the same band, but at a lower elevation, and innumerable outcroppings are noticeable leading from the vein on which the deep shaft of the Little Rapids Mine is located. An opening has been made, at about two hundred feet lower elevation, that has exposed a large body of very excellent phosphate, similar in colour and texture to that which has been raised from the deep shaft on the adjoining property. The supposition is that this is a continuation of the same vein, and if the theory is correct it not only establishes a high value for this new mine, but is strong evidence that the value of the *Little Rapids* has not been overestimated.

The Emerald Mine.—The reputation that this mine bears is so widely known that no newspaper criticism can serve any purpose. It continues to yield abundantly, and that it will do so for years to come is not questioned. The property is now thoroughly equipped with suitable plant, and large additions have been made to the buildings. Phosphate is coming to the surface rapidly and the output of the mine that will go forward this year will exceed that of 1884, but it is rather early in the season to form an estimate of what it will actually amount to. The Ottawa Phosphate Company, who purchased this property some eighteen months ago, has good reason to be pleased with its investment. The result of the first season's operations has been very gratifying to the shareholders who attach a high value to their property.

The Washington Mine.—adjoining the Emerald—is another property owned by the Dominion Phosphate Company. It was formerly known as the *Lansdowne*, but as the company is chiefly composed of American capitalists the mine was re-christened. Since it fell into the hands of its present owners a quantity of dead work has been done, and deposits of mineral of considerable extent have been developed on the property. The amount of phosphate mined will not be sufficient to cover the outlay for work done, but under the careful management of Mr. Smith, the company's superintendent, the expenditure has been judiciously made. He looks for satisfactory results from this year's operations.

Battle Lake Mine.—The Lievre River Phosphate Company is working a deep shaft at this mine with encouraging results. The vein on which the shaft has been sunk to a considerable depth holds out very strong, and has the appearance of a well defined fissure. Although it was late in the season when the company began operations on this property there is already a fair quantity of mineral raised and awaiting

transportation. Later in the year extensive mining will be carried on at other locations in the phosphate district owned by this company, and under the able management of Captain R. C. Adams, the business manager and President of the Company, all operations are likely to be successfully conducted.

With the exception of the mine in Templeton, owned by Messrs. McLamin & Blackburn, those we have mentioned are of the most importance in Ottawa County, and are the chief producers. From all of these mines large quantities of phosphate are being forwarded to the bank of the Rivière du Lièvre and being piled there at convenient points from whence it will be forwarded in scows, during the season of navigation, to the Canadian Pacific Railway at the landing north of Buckingham village, and thence to Montreal to await ocean transportation. The force employed at the mines above-mentioned aggregates about 300 men.

PHOSPHATE QUOTATIONS.

The most recent European advices quote, for Canadian Phosphate, thirteen pence half-penny for 80 per cent. mineral, with one-fifth of a penny rise, but as no phosphate is offering at present it is difficult to arrive at a market value. We are informed that producers are not attempting to make contracts and will hold out for higher prices than have yet been spoken of.

SHORT LINE RAILWAY.

Before the close of last year the Canadian Pacific Railway Company completed the grading of the branch from the main line at Buckingham Station to the landing on du Lièvre river, north of the village, a distance of about three and a half miles. As soon as the frost leaves the embankments in the spring the rails will be laid and ballasting proceeded with, so that the company will be ready to carry passengers and freight over this branch on the first of May. The transportation of phosphate from Buckingham Village to the Railway Station, a distance of only three miles, has always been a serious drawback to the industry, owing to the bad condition of the road at all seasons, and to its being practically impassible during the spring and autumn months. The construction of this branch line will be a boon to phosphate miners, as it will afford them facilities for shipping at all seasons of the year, and will reduce the cost of transportation quite seventy-five cents per ton. To the C. P. R. Co. it will surely be a profitable investment, as by its construction the entire output of the mines contiguous to the Rivière du Lièvre will hereafter be carried by rail to Montreal, whereas thousands of tons have heretofore been sent each year to the Ottawa River and forwarded thence in barges to Montreal. The railway Company is now erecting receiving bins at the landing for the accommodation of shippers, in which the ore will be deposited before being put on board the cars. It is understood that it is the intention of the company to have steam cranes at convenient points, by means of which phosphate can be transhipped in the summer season direct from the scows to the cars. Such facilities for handling ore are very desirable. With the construction of the Lock at the Little Rapids all obstructions to the cheap transportation of phosphate will have been removed, and larger profits will accrue to mine owners.

The first copper mine worked in the United States was in Connecticut in 1709.

NEW USE FOR PHOSPHATE.

A portion of last year's output of the Canadian phosphate mines was purchased by a firm in England and employed in the manufacture of phosphorous. The gentleman who made the sale to this firm asserts that a large quantity would be consumed for this purpose if high grade mineral, running 80 per cent. and upwards, could be assured to the manufacturers. This should have the attention of miners.

MICA MINING IN CANADA.

This is rapidly developing into an industry of much importance in the country, and is assuming larger proportions each year. Since our last article appeared on this subject some significant discoveries have been reported of mica veins and deposits that promise to yield a very fine quality of the mineral, in fair merchantable sizes, and of superior quality. One of these locations has been purchased by a gentleman of this city, who is organizing a joint stock company with a view to beginning mining operations at the close of the present winter. The sample plates we have seen from this property, and the flattering reports we have read, are evidences that the deposit to which we refer will become an important producer.

M. Allan's Pike Lake mine is yielding very excellent mica in large quantity and in sizes to supply any demand, the crystals being of unusually large dimensions, and exceptionally perfect in their formation. The yield of merchantable mica from this mine is an unusually large percentage of the crystals actually mined, and commands a high price.

Mr. Allan's Villeneuve mine is producing a very fine quality of muscovite, equal to any that has been mined in any part of the world, in point of clearness and its resistance to heat, and the crystals are capable of being cut into plates of the ordinary sizes used by stove manufacturers, and running as large as 6 x 10 inches. The body of crystals in sight at this mine is very extensive and the micaceous vein, in white quartz, is traceable for several hundred feet, shows a very strong lead at the surface.

The mine being worked by Smith & Co., in the Township of Loughborough has yielded a large quantity of an amber coloured mica, and continues to be very productive. The crystals are massive and in most cases regularly formed. Several thousand pounds of merchantable plates were shipped from this mine last year, and a portion of the output was sold in the United States. The owners of the property have realized large profits from their operations.

Another mica location in the township of March was prospected late last autumn, and several openings that were made in the vein showed it to be a strong one and of some extent. The development, however, up to the time work was suspended on account of frost and snow, was insufficient to enable us to speak positively of the yielding capacity of the deposit, the crystals near the surface, though well formed, being too small to produce merchantable plates in any quantity. The quality of the mica is very fair, it stands heat well and is perfectly clear. One peculiarity of this mica is that portions of crystals, one half inch in thickness, are quite transparent.

When the mines above referred to have been more developed they will be capable of supplying the entire Canadian demand, and will have a surplus to ship to foreign countries. At

present, however, better prices can be obtained from home consumers than from foreign markets, and until the production increases none will go abroad.

A NEW USE FOR MICA.

Experiments have been made lately for transforming mica into brocades or bronze colors, whereby a new field is opened to the utilization of this mineral. To this end the mica is well crushed, boiled in muriatic acid, washed and separated according to the size of the scales thus obtained. The obtained lamina exhibits a beautiful glass-like lustre of silver white appearance, and are denominated in commerce, brocades, crystal colors, or mica bronze. The four kinds of silver white, or color brocades, which are met with in commerce, are sorted according to the size of the laminae.

They possess the following advantages over the ordinary lubricants:—First, they do not contain any ingredients injurious to health. Second, they possess the metallic lustre of the metal brocades, and even surpass them in brilliancy of color. Third, brown, black, blue, green and rose are represented in a rare lustre, which is not the case with metallic brocades. Fourth, they deport themselves perfectly indifferent towards sulphurous exhalations; they retain their lustre in moist air; have small specific weight, and possess more body. These fabrics might find application on metal, bristol board, wood and glass, consequently they may be adopted for the manufacture of these and other fancy articles, for coloring artificial flowers, wall paper, sealing wax; in short, in all technics where colors are employed. In applying them, it is to be recommended to cover the articles with a paint similar in color to those of the brocades. For silver, for instance, white lead; for blue, ultramarine. In using blue color the paint is ground with a mixture of four parts of glue and one of glycerine, upon this field, when hard, the brocade is spread. The most suitable binding material for the last mentioned, is a paste composed of four parts of starch and one of glycerine. In using oil paints as ground color, a good dammar or pale copal varnish is more suitable than the paste described. When finally coated with a proper spirit or turpentine varnish these articles take a lustre far surpassing in splendor and durability those ordinarily obtained. Articles coated with asphalt varnish, and afterwards spread over with silver brocade, take a granite-like appearance. If employed in the preparation of isinglass, magnificent crystallizations are obtained, well suited for inlaying in buttons and other articles. Furthermore, they recommend themselves for imitating gold, rain and snow in theatres, on account of their small specific weight and cheap price. Finished porcelain and glassware might be coated with the above brocades, if brought again to the heat of their melting point.

Mica was first used as a substitute for glass in windows, then, on account of its durability when exposed to high temperatures, it came to be extensively used for stoves, and for this purpose it was largely imported from Europe up to the year 1855, when the beds in the United States were first taken advantage of. Mica is also made into reflectors, sea compasses, inlayings for wood instead of enamel, and many other articles. But one of the most important uses is a substitute for glass in spectacles, which are intended to protect the eyes of fire and metal workers against sparks and fragments of metal and rock.

Minerals of the Ottawa District.

Abstract of a paper read before the Ottawa Field-Naturalists' Club on the 15th January, 1885, by Charles W. Willimott, Esq.

Specially reported for the MINING REVIEW.

Mr. Willimott, of the Mineralogical Staff of the Geological and Natural History Survey of Canada, in the valuable paper which he presented, gave an extended account of all the minerals which he had personally observed in portions of the Townships of Templeton, Hull, and Wakefield, in the County of Ottawa, and we regret that want of space prevents us from reproducing his remarks in full. His notes upon the economic minerals met with are, however, given at some length.

Native Gold was reported by the late Mr. Vennor, who obtained a specimen from Captain Cates, of the Pêche Village, said to have been picked up by him during a journey through the neighboring woods, on the east side of the Gatineau River in Wakefield. The specimen was seen by the lecturer, and consisted of fine visible native gold in a ferruginous quartz, associated with green apatite. It assayed 11.725 oz. gold and 52.323 oz. silver to the ton.

Lead and Zinc. The only representatives of these metals observed in our district are the two sulphides, galena and blende, which are found associated in a greyish-white crystalline garnet that occurs in lenticular masses in a crystalline limestone on lot 6, Range 1, of Wakefield. The blende, which is in black, shining, cleavable masses, is often so intermingled with the galena as to give apparently more prominence to the latter mineral, a feature that must ever be guarded against by speculators.

Copper. The only mineral representing this is the yellow sulphide (Chalcopyrite) found in small imperfect crystals in some veins of apatite.

Iron. The magnetic oxide, or magnetite, is found in all three townships, but the most workable deposits yet discovered are in Hull Township, where mining has been carried on for the last thirty years. The ore from the mines here is coarse in texture and often traversed by veins of red hematite, besides occasionally enclosing scales of graphite and mica. Lenticular patches of the ore occur in a dark green pyroxenite on the south half of lot 7, Range 1, of Wakefield, and on the north half of the same lot it fills a vein in limestone. Here the outcropping portion is highly crystalline, and good crystals, often variously modified, may be obtained in consequence of the crumbling nature of the walls.

Specular Iron Ore occurs at the Haycock location in Templeton and Hull, in parallel beds in a highly feldspathic gneiss. This ore is often mixed with the magnetic oxide, frequently to such an extent as to almost wholly replace it. A white granular apatite and a translucent variety of greenish fluor are often associated. The finest crystals of specular iron ore found in Canada come from this location.

Limonite occurs in a vein about a foot wide, resulting from the alteration of iron pyrites, and flanked by a less altered pyritous substance enclosing black shining crystals of tourmaline. It is probably not in sufficient quantity to be of economic value.

Boj Iron Ore is found in several places in Templeton and Hull but the extent of its distribution is not known.

Of the two sulphides of iron, *Pyrrhotite* and *Pyrite*, the former is uncommon, but occurs in small veins and masses in some of the apatite mines, while the latter is widely distributed and

is rather an objectionable substance. It frequently permeates apatite deposits to such an extent as to detract greatly from their value. In some places it occurs in large bedded masses, enclosing various minerals, of which the most noticeable are crystals of apatite and scapolite with their angles somewhat rounded; in other places it is evenly distributed through large deposits of apatite.

Molybdenum. The sulphide of this metal (Molybdenite) has been detected in small foliated masses at McBryde's mine in Wakefield. Until within the last few years this mineral commanded a price ranging as high as \$4 a pound, being employed for the production of a blue dye for calico printing, but since the substitution of aniline colors it is scarcely saleable at any price.

Graphite or Plumbago bears a strong resemblance to the last named mineral, but is scarcely as bright in lustre, and does not give the peculiar greenish streak of molybdenite on porcelain; but to be certain of its identity chemical tests are necessary. Graphite occurs in disseminated foliae throughout the bands of limestone and pegmatite that traverse the three townships, but not in paying quantities. On lot 7, R. 1, of Wakefield, lenticular masses of serpentine enclose graphite in foliated masses as well as disseminated foliae. On the same lot a fine granular variety, somewhat similar to the Cumberland plumbago, occurs in pockets of a crystalline limestone.

Apatite. Outcropping veins or beds are by no means so conspicuous as freshly broken specimens, being usually indicated merely by a whitish weathering that might easily pass unnoticed. Its resemblance to pyroxene has often caused much annoyance to pseudo-miners. This mineral, locally known as phosphate, is found of almost all colors, from white to almost black, passing through various shades of green, red, yellow and blue, this last being the most uncommon. The green and red varieties predominate, and in many mines are interblended. At the Jackson Rae mine in Templeton and at the Spring mine a quantity of beautiful transparent sea-green apatite has been extracted, comparatively free from foreign inclusions. A very pure reddish mineral, assaying as high as 86 per cent. tribasic phosphate of lime occurs in bedded masses at Gemmill's mine in Wakefield. A block, estimated to weigh four tons, was blown out by a single blast from one of these masses. Moore's mine, in the same township, is remarkable for the abundance of crystals extracted during the past four years. Huge crystals, hundreds of pounds in weight, have been met with, imbedded in a pink cleavable calcite. At this mine two years ago a beautiful vein of inter-locking crystals of a transparent sea-green color had been developed. The gangue had been dissolved to the depth of a foot, giving great prominence to these forms, which, owing to their fragility could rarely be removed intact. The rounding of the angles of apatite crystals has drawn forth many theories, fusion being offered as an explanation by some mineralogists, whilst others attribute the disfigurement to solvent action. Whichever theory we adopt serious objection may arise, as minerals easily fusible are found preserving their sharpness of outline, associated with rounded crystals of a less fusible apatite; and again rounded crystals of pyroxene are met with, though much more rarely, imbedded in limestone, also enclosing rounded crystals of apatite. It is hard to understand how the apatite and pyroxene alike should be attacked by a solvent while the latter is almost insoluble. (Some aluminous varieties are decomposed with great

difficulty with sulphuric acid at a temperature of 250° C.) It frequently happens that crystals of apatite having sharp angles are imbedded in the same limestone with others that have been rounded. On the other hand it rarely happens that crystals lining the walls of fissures have their angles rounded, although one or more of their faces are frequently obliterated or otherwise contorted, probably in consequence of interrupted crystallization. Bent or broken crystals that have been re-cemented are of common occurrence. The same crystals often enclose calcite, and others again have cavities extending the whole length of the crystals, with sometimes a rounded pebble of cleavable calcite contained in them.

At an opening known as the Gow Mine, in Hull, a pit has been sunk 150 feet in limestone, parallel to the wall of a large fissure which may be said to characterize this band for miles, it being made the more conspicuous by the abundance of crystals everywhere adorning its walls. Several mines have been established on this band with gratifying results. The apatite, which is chiefly of the greenish variety, runs in most cases conformably with the limestone, although some small veins were seen intersecting it. The aggregate yield of this band in the Township of Hull may be roughly placed at 4,500 tons.

We also find this mineral an ingredient of the orthoclase band running through the same township, and likewise characterized in places by a contact wall covered with crystals of pyroxene, apatite, phlogophite, &c. No remunerative mines are reported in this band, though many attempts have been made to work the small veins that occurs.

At Haldane's mine in Wakefield a pit has been sunk 125 feet on what appears to be a vein, cutting the stratification of a dark green granular apatite, impregnated with pyrites and often enclosing epidote, scapolite and pyroxene. This last is frequently of a cavernous nature, the cavities being filled with chabazite and a silky fibrous mineral resembling natrolite.

At Wilson's mine, in the same township, a fine granular strongly coherent reddish apatite, mixed with a green, cleavable variety, filled a vein 12 feet wide in gneiss, which however soon became "nipped."

In following some of the crystal beds at Moore's mine, large cavernous "vugs" were struck, walled with beautiful crystals of pyroxene, phlogophite and apatite. One of these caves was 30 feet long, 6 feet wide and 8 feet high, roofed with a pink crystalline limestone, studded with green crystals of apatite standing out in relief on its partly dissolved surfaces.

The comparative dullness of the phosphate trade has caused a partial cessation of mining operations, especially noticeable in the western parts of the apatite region during the past twelve months, and has tended to concentrate and systematize the work, and to restrict success to those having practical experience. In Hull, up to date, 5,000 to 6,000 tons have been obtained; Wakefield has probably afforded between 8,000 and 9,000 tons, and Templeton between 16,000 and 17,000 tons. The total output of all the mines in Canada for 1884 is 22,143 tons; and if we deduct 1,790 tons obtained from the Perth and Kingston districts, the remainder, 20,353 tons, represents the product of Ottawa County for one year.

Wallastonite, a fibro-tabular mineral, occurs on lots 7 and 11, R. 1, Wakefield.

Pyroxene, in its various forms is the most common associate of apatite.

Uralite, found in Templeton, apparently forms a transition mineral between pyroxene and hornblende.

Hornblende is of course found in all the townships in many forms, including *actinolite* and *tremolite*.

Garnet. One variety was mined to the extent of about two tons on lot 18, R. 2, Wakefield, being mistaken for red apatite. An amber colored variety, probably *Essonite*, occurs on lot 14, R. 1, Wakefield. This, too, was mined for apatite, but has since been sold in the States, and the locality has been visited by dealers from Philadelphia and New York, who have now almost exhausted the mineral.

Handsome crystals of a *Lime Garnet* are found a few miles farther west, and *Chrome Garnet* on lot 29, R. 4, Wakefield.

Zircon is found in the development of the apatite deposit. A crystal 15 inches long and worth \$200 was found on lot 23, R. 13, Templeton, and destroyed by a miner ignorant of its value.

Idocrase is found in Templeton and Wakefield.

Caenoclase is the name given to a mineral described by Prof. Lewis, occurring on lot 7, R. 1, Wakefield, in square prisms with their solid angles unsymmetrically truncated. Color, white, generally stained with oxide of iron; lustre, resinous, sometimes inclining to pearly, opaque. Mr. Willimott claims that the name, which implies poor cleavage, is misleading, inasmuch as the mineral has no cleavage, and that the phosphoric acid given in Mr. Lewis' analysis is due to contained apatite prisms.

Scapolite may be regarded as one of the most constant associates of the apatite deposits, and generally occurs in bedded masses.

Wilsonite is believed to be an altered scapolite.

Epidote occurs in the stratified rocks and as crystals in mixed veins.

Mica is a name which includes a number of doubtful minerals, all having one perfect basal cleavage. Besides being disseminated through the schistose and gneissic rocks it often constitutes large volumes in some of the phosphatic veins, either distributed in small scales through extensive masses of apatite and pyroxene or forming large aggregations, sometimes affording plates two feet square, in a calcareous gangue. The mica fever, encouraged by flattering reports of irresponsible persons, will always be regarded with suspicion by shrewd capitalists. The existence of the mineral in unlimited quantities in the neighboring townships is undeniable, but with few exceptions the plates are unmarketable in consequence of dark color, inclusion of minerals, or contortion. On the south half of lot 10, Range 10, Templeton, plates two feet square were taken out during the development of an apatite deposit, which were perfectly free from folds, inclusions or opacity, and yet were unsaleable because they would not stand the New York fire test. This same mica has been exposed to the heat of an ordinary stove for two years, and although it became slightly discolored, it compares favourably with some grades of the commercial article. At Chitty's mine in Wakefield great quantities of this mineral were met with, capable of supplying very large plates, though occasionally marred by lateral joints. What this mineral lacks in a commercial point of view is counterbalanced by the magnificent prisms available to the scientific world, the crystals lining the walls of fissures or enclosed in limestone being for symmetry unrivalled in the Dominion.

Oligoclase is found on lot 16, Range 12, Hull.

Albite is mentioned by Dr. Harrington as occurring in Templeton.

Orthoclase is found in all the Townships.

Titanite or *Sphen* is a common associate of apatite veins.

Tourmaline is met throughout the neighborhood. The finest crystals occur on lot 15, Range 12, Hull.

Talc, or something having its aspect, occurs at McLaurin's mine, Templeton.

Steatite is found in small bedded masses in all the townships.

Serpentine occurs in the limestone bands. No mention is made of any workable location.

Chrysotile, or serpentine asbestos occur near Chelsea, forming concentric veins in a serpentine limestone, with fibres sometimes $1\frac{1}{2}$ inches long, but rather too strongly coherent to be of commercial value. Other localities near Templeton have afforded asbestos with more separable fibres. A quantity was mined from this locality some years ago.

Ripidolite is found on the west half of lot 18, Range 9, Templeton.

Prehnite was noticed at Post's mine, Templeton.

Stilbite, *Chabazite*, *Natrolite* and *Heulandite* are four representatives of the zeolite group which have been noticed.

Barite, or sulphate of barytes, is the only sulphate which has been found in these townships. It is used extensively for the adulteration of white lead in consequence of its high specific gravity and cheapness, often replacing 75 per cent. of the lead. A vein of this mineral was worked some years ago in Hull. There is another deposit on lot 12, Range 12, Templeton, in white lamellar bedded masses in gneiss.

Calcite is the only representative we have of the carbonate group. Extensive beds of amorphous and crystalline calcite or limestone characterize this neighborhood, more especially the western portion.

Fluorite or fluor spar is amongst the associated minerals of the apatite veins.

Spinel and *Rutile* represent the anhydrous oxides in addition to the members of this group included with iron ore.

Quartz is one of the commonest constituents of our rock masses and fills many of the veins.

Jasper occurs in a bed 2 feet thick, overlain by gneiss, on lot 15, Range 10, Hull.

Agate in the form of chalcedony is found on lot 17, Range 9, Templeton.

In the discussion which followed the conclusion of the paper Mr. Lawson stated that he had not quite caught the lecturer's idea respecting the rounding of angles of pyroxene and apatite. Mr. Willimott again pointed out that as pyroxene and apatite occurred together it was strange that the agent, whether it were fire or water, that had power to dissolve the angles of the very refractory pyroxene should not entirely dissolve apatite crystals. Mr. Lawson thought water at very high temperatures, would dissolve almost anything.

Mr. W. P. Anderson understood that the inferior quality of our mica was a result of its being phlogopite, a mineral containing a small percentage of water, whereas the best commercial mica was muscovite, which contained no water. He had been informed that workable deposits of muscovite had been found in the Perth district, and asked if it were the case. The lecturer stated that muscovite was undoubtedly found in this locality; and also in answer to questions, that the New York fire test was recognized throughout Canada, and that muscovite was not affected by the blow-pipe.

In reply to Mr. Small the lecturer stated that his apatite statistics had been taken from the export returns, and, therefore, were exclusive of the quantities mined but yet in the country, and also exclusive of the 800 tons used last year by the Brockville chemical works.

During the discussion it was elicited that whereas now it did not pay to mine anything

poorer than 70 per cent. apatite, arrangements had been made for shipping 65 per cent. stuff for treatment by a new process. Members of the British Association had told Prof. Macoun that some of the refuse of the Templeton mines was superior to anything worked in England, and that in the future middlings would be of great value.

Mr. Lawson, Geological Survey, said that untreated ground phosphate was proving better for fertilizing than superphosphate, and asked if any official statement to that effect had been made.

The lecturer thought there was no such statement, but agreed in the superiority of untreated apatite, which would resemble ground bone in its action.

Mr. Small instanced the report of the Department of Agriculture, which gave the results of tests by the Agricultural College at Guelph. There the untreated fertilizer was found to have good effects on root crops in the third year after application, but not on cereals. He added that Scotch authorities were endorsing this view, also that there was a large demand for the ground mineral in Belgium for fertilizing sugar beet districts.

Mr. Fletcher thought that under these circumstances the farms in the apatite districts should be particularly fertile, which did not appear to be the case.

Rev. Prof. Marsan said that on the Upper Gatineau were many particularly fertile patches which he attributed to the existence of apatite deposits in the vicinity. He thought that the theories of those who contended for the use of superphosphate were quite reconcilable with those of the advocates of the raw material, as in spring all the phosphorus was in the roots of cereals, in July in the straw, and at harvest in the fruit; and as cereals required the phosphorus quickly, superphosphate would show the best results on them, while roots required it more gradually, and had time to absorb it from the slowly disintegrating rock.

In the reports of the French agricultural schools superiority was given to the raw material, and the French newspapers were advising its use.

He endorsed the lecturer's remarks as very exact in every point. He had studied the minerals near the Desert, where the geological formation is very similar to that of Chelsea, no tract being so uniform as the crystalline limestone band. The survey had gone 60 miles north of Ottawa; 90 miles farther the same formation continued.

He had found gold on Trout Creek, which empties into Eagle River. When he first heard of it, although the formation is a favorable one for gold deposits, he paid little attention to the report, as the farmers often mistake pyrites and mica for the precious metal, and would show him great finds of these glittering particles; but having a favorable opportunity he brought a sample of sand to the college and found traces of gold in it, but has since been unable to obtain a further supply in consequence of the water being too high when he was there.

A Peace River pioneer states that gold is now being discovered in good paying quantity along the various tributaries of the great Unpyah.

The Edmonton *Bulletin* speaks very encouragingly of the prospects for alluvial gold mining in the vicinity of Point le Pied, on the Saskatchewan, and states that Mr. Jerome Boudrea, formerly of New Brunswick, is preparing for active operations next spring.

THE OUTLOOK FOR COPPER.

Commenting on this important subject the *Engineering and Mining Journal*, (N.Y.), states that—"The disturbing element in the world's copper market is undoubtedly the production of the United States. From every other quarter, England's importations show only moderate fluctuations; a falling off from Spain of 2,600 tons, despite the promise of increase; a gain of 3,800 tons from Chili, despite the prediction of the total extinction of her copper industry by low prices; 1,100 tons increase from Australia, compensated for by a decline of 1,000 tons from Newfoundland. But the record of the United States for the last three years is startling: 745 tons exported to England in 1882, 9,410 tons in 1883, and 17,309 tons in 1884. And this from a country which, in 1880, in order to meet an extraordinary demand of its home market, had to import Chili bars.

Such a sudden addition to the world's supply has of necessity checked speculation by introducing a new and uncertain factor into the calculations on which speculation is based, while the steady decline in price has induced manufacturers to run on low stock. And yet the world's consumption has kept pace so closely with the world's production that the average visible supply for 1884 was 3,865 tons less than in 1883, and 17,199 less than in 1880. It is, therefore, the anticipation of a still larger production from North America that alone depresses prices in the face of reduced stocks. If we should continue to increase our output at the rate of the last few years, the balance between supply and demand would undoubtedly be seriously disturbed. If, on the other hand, the tide of our copper production is at its flood, we may expect the tide of prices to rise; and there is reason to suppose that possibly the maximum of production and probably the minimum of price have been reached."

After referring to the copper producing districts and the mines throughout the United States, and to the rapidity with which some of the more recently developed mines have become enormously productive, the *E. and M. Journal* adds, "that every mineral deposit in the west is worked on a high-pressure system that aims at making output great, no matter at what waste, and no matter how much more economically the work could probably be done in the future. The result is that the practical capacity of a mine or district is rapidly reached. It must also be remembered that all the work heretofore has been done on the rich, partially decomposed sulphurets, which overlie the unaltered ores; and that the percentage of the ores now treated is probably so much higher than those the company will have to handle before many years have passed, that the plant, now capable of producing from 20,000 to 25,000 tons a year, will have to be greatly augmented in size to turn out a like quantity from the deep, leaner ores.

There still remains to consider the course of the Lake Superior companies. At the present price of copper, there are probably only four or five mines that more than cover expenses. These, if they deem it best, can increase their mechanical appliances so as to handle a greater quantity of ore; but only one at the present time, the Calamet & Hecla, expresses the intention of adopting this policy of making these light profits heavier by largely increasing the output. Any gain, however, from this quarter will be nearly balanced by loss of production through the closing of a number of smaller mines, should the depression last. No new mining enterprise of any consequence now

under way in the Lake District will add to this year's production, and the times are not propitious for the starting of fresh ventures.

We believe, therefore, as we have already remarked, that in the United States, the largest producing market of the world, the maximum of production has been nearly reached, and if so, it almost follows that the lowest limit of price has been touched; for, even more remarkable than the rapid production of the past four years, has been the complete absorption of the enormous surplus. If, therefore, this growing source of supply be checked, and the new industries that have absorbed it continue to grow, the inevitable result must be a rise in price."

Taking into account the present condition of the market, and the outlook for copper mining in North America for some time to come, it would be unwise just now to open new mines.

COPPER EXPORTS.

During the fiscal year ended June 30th, 1884, there was exported, in ore, to the United States, from the copper mines of the Eastern Townships 2,234,642 pounds of fine copper. This was the actual quantity of copper contained in the pyrites shipped, chiefly from the Capelton mines, for the manufacture of sulphuric acid and the subsequent extraction of the metal.

The total amount of copper exported from Canada during the period above mentioned amounted to 3,589,135 pounds, as follows:—

	Pounds.
Fine copper (in ore) exported to the United States.....	2,244,685
Fine copper (ingots and old copper) exported to the United States....	248,846
Fine copper (chiefly regulus) exported to England.....	1,095,604
Total.....	3,589,135

LAKE SUPERIOR MINING NOTES.

The Town Council of Port Arthur has endorsed a petition from the mine owners of the district to the Commissioner of Crown Lands, praying that the Ontario Government will construct a bridge over the Kaministiquia River, between Murillo Station on the C. P. R. and Rabbit Mountain. Such an improvement would greatly facilitate access to the mines.

It is reported that the Silver Mountain Mining Company has received an offer from the Silver Islet Mining Company to purchase the property known as *Silver Mountain*. The price offered is said to be \$300,000—\$50,000 to be paid in cash and the balance within one year. It is thought, however, that the sale will not be completed as the company prefers to work rather than to sell the mine.

W. H. Furlonge, Mining Engineer, who has made an examination of the Beaver Mine, states that he gathered five samples of ore which represented the average of the vein, as then exposed for thirty feet in perpendicular height, and that these samples yielded to Mr. Chas. Kreissman, assayer, an average of \$995.75 in silver to the ton of 2000 pounds; the assays yielding \$660 at the outcrops on the top of the hill, and \$2,749.47 thirty feet below. We question very much that this is the average of the vein.

Mr. Furlonge also reports, after visiting the localities, that rich silver ore is now being taken

from the drift and cross-cut at the Rabbit Mountain mine, and that he saw fine native silver being blasted out at the Twin City. He is of opinion that the whole vein stone of both these mines is good stamp-rock.

A valuable discovery of gold bearing quartz has been made by the veteran explorer J. McKellar, of Fort William, District of Lake Superior, in a new locality. Specimens are now in the hands of Prof. Hoffman, of the Geological Survey, for full and complete analysis. Application for the location was duly made and has been granted by the Ontario Government, who show a much more liberal spirit than the Quebec Government in their disposal of mineral lands. A number of Ottawa capitalists have undertaken the developing of this latest find of Mr. McKellar.

GENERAL MINING NOTES.

NOVA SCOTIA.

The Hall-Anderson company began to ship bullion before the first of the year.

The Salmon River gold mining company will, if report be true, increase its milling capacity by twenty stamps.

The Superintendent of the Essex gold mine reports that early in December he had extracted 58 ounces of gold from 51 tons of quartz.

There has been recently received at this office a very handsome specimen of gold quartz from the Oxford Gold Mine, Lake Catcha District, Nova Scotia. We hope the vein, from which it was taken, carries similar quartz in quantity.

According to the official returns to the Commissioner of Mines for Nova Scotia, there was raised in that Province during 1884: 1,389,295 tons of coal, and 16,079 ounces of gold, against 1,422,553 tons of coal, and 15,456 ounces of gold in 1883.

QUEBEC.

Iron mining in the Township of Bristol is being prosecuted with vigour. The ore is being conveyed by teams to Braeside, and thence by Canadian Pacific Railway to Renfrew, from which point it is forwarded to Kingston over the Kingston and Pembroke Railway.

A new company, under the name of Johnson & Co., has been organized in the Province of Quebec for the purpose of working Asbestos mines in the Eastern Townships, and carrying on other mining operations, with headquarters in the Township of Thetford, county of Megantic. The capital stock is \$250,000.

Prospecting for silver is being vigorously proceeded with by Messrs. Ross & Torrance on a property owned by them, situated about 25 miles from the village of St. George, county of Beauce, Province of Quebec, and not far from the border line of the State of Maine. Mr. Torrance was formerly engaged on the Geological Survey, and is a mining engineer of some skill; he is personally superintending operations, and has 15 to 20 competent men employed. Galena, carrying silver in paying quantity, has been met with, and Mr. Torrance is sanguine that the property will develop into a mine of great value.

ONTARIO.

A small force of miners is employed at the *Coe Hill* iron mine for the winter months. It will be increased again in the spring.

The Cleveland Mining Company, (limited), has been incorporated for the purpose of carrying on operations in the Counties of Hastings and Peterboro', Ontario, with head quarters at Trenton. The capital stock is \$750,000, divided into 7,500 shares of \$100 each.

A good quality of lithographic stone is being quarried in Hastings County, but the sizes of the blocks are of too small dimensions to command a high price. The quality is so good that the owners are encouraged to proceed with quarrying and are hopeful that more solid beds will be met with at a greater depth from the surface.

Work has been again suspended at the Canada Consolidated Gold Mine, in Hastings County, Ontario. The cause for the suspension is attributed to a disagreement between Mr. W. H. Stevens, consulting manager, and Mr. R. P. Rothwell, active manager. It is understood that Mr. Stevens has been advancing the money to carry on mining operations, and having become dissatisfied with the results has stopped the supplies. According to the Secretary's report, this Company's indebtedness is \$300,000.

BRITISH COLUMBIA.

The Burns Mountain Quartz Company continues to drive the tunnel.

Coarse gold diggings have been discovered on Forty-nine Creek, a tributary of Columbia River, and miners are at work.

The Yellow Lion Company have been prospecting during the winter, in order to ascertain where the best pay is, and to be ready to wash in early spring.

In the Cariboo District there has been almost too much water in the creeks for winter mining. The Barber, the King, and three other companies have, however, been working on William Creek and are taking out pay.

A large vein of silver-bearing quartz has been discovered near 108-mile house, 61 miles above Clinton, on the Cariboo wagon road. The discoverer is Wm. Walker, the telegraph operator, and the vein is said to assay quite rich.

About twenty miners are making preparations to visit Lorne Creek mines as soon as the weather is favourable. Some of them are among the number who were in during the first year, and are very sanguine of large returns during the coming season.

The miners of Lillooet district have taken out \$108,000 during the past season—rather more than is expected of Cassair. It is \$40,000 more than Lillooet yielded the previous year, and the miners are hopeful of making a still better showing this year.

Fine specimens of silver ore have been brought from Kootenay Lake. It is said that about fifty companies have taken up claims and intend to work the mines vigorously. A New Haven company has secured mineral land on the lake and, if they can hold the claim, speak of putting up smelting works in the spring.

On Antler Creek the Nason Company has sunk a shaft fifty feet, and will drift one hundred feet in rock to reach the channel. It has no doubt been reached by this time. This company has used 59,000 feet of lumber in constructing a flume 3,400 feet long by four feet wide. If the Nason Co. is successful, other portions of the creek will be prospected.

It has been decided to flood Nos. 3 and 4 shafts, at the Wellington Collieries, high enough to close the connection between the two mines, and by this means it is hoped the fire will be extinguished and an opportunity afforded to work the upper portion of No. 3 mine. Mill-stream will be turned into the shafts and it will take a week to flood them.

The returns from the three principal fields of gold production are in, and, considering the limited number of miners engaged in the industry, the results are gratifying. A total output of \$691,000, although small when compared with the great returns of 1862 and 1863, still, when taken into account with the other productions of the province, it is by no means to be despised. During the year just closed the yield was as follows:—

Cariboo.....	\$124,000
Lillooet.....	108,000
Cassair.....	103,000
Kootenay.....	56,000
Total.....	\$691,000

UNITED STATES.

Thirty-one million dollars worth of gold was obtained from the United States mines last year.

The cost of strikes in the Hoching Valley coal mines for the last six months of 1884 amounted to \$4,000,000.

It is expected that the Calumet and Hecla alone will shortly be crushing at the rate of 3,300 tons of rock a day equivalent to 50,000,000 pounds of copper yearly.

The shipment of iron ore from Lake Superior mines, including the Menominee district, amounted to 2,455,924 gross tons in 1884, showing an increase of 103,636 tons over the shipments in 1883.

The Calumet and Hecla Copper Mining Co. will pay a dividend of five dollars per share on the 2nd of February, aggregating \$500,000. A year ago the stock of this company was selling at \$234. The present price is \$153.

The money value of the output of the gold and silver mines of the state of Colorado for 1884, will aggregate about \$20,750,000, or \$5,500,000 less than last year's, due to the depreciation in the price of silver, lead and copper.

The production of the precious metals in the States and Territories west of the Missouri River during 1884, was as follows:—Gold, \$26,256,542; silver, \$45,799,069; copper, \$6,086,252; lead, \$6,834,091—aggregating \$84,975,954.

The money value of the product of the Comstock mines for 1884, was as follows:—Andes, \$1,722; Ophir, \$81,841.77; Potosi, \$200,000; Savage, \$13,058.88; Union Consolidated, \$5,065.13; Gould & Curry, \$19,206.18; Hale & Narcross, \$102,712.62; Mariposa Mill, \$21,-

\$90.30; Belcher, \$386,243.73; Crown Point, \$539,522.73; Kentuck, \$370,364.37; Yellow Jacket, \$656,915; Monte Cristo, \$28,356.34; Lady Bryan, \$9,934.58—aggregating \$2,436,833.33, being the largest product in any one year since 1879.

The discovery in California lately of considerable quantities of the peculiar stone used by lithographers is the subject of much remark in papers of that State. Heretofore the best lithographic stones have been found at Kelheim and Solenhofen, near Pappenheim, on the Danube, in Bavaria; but they have been found also in Silesia, England, France, Canada and the West Indies. They are found in beds, commencing with layers of the thickness of paper till they reach the dimensions of one and several inches in thickness, when they are easily cut, being yet soft in the quarries, to the sizes required for printing purposes.—*N. Y. Mining Record*.

REDUCED WAGES.

Early on the morning of January 19th, writes a correspondent of Medicine Hat to the *Nor'-Wester*, the miners employed in the Saskatchewan coal mine went, as usual, down the incline, and were about to enter the mine, when the pit foreman asked if there was any loose coal in, and those who had some got to work and had it up by noon. The other men were told to see well to the propping of the passages, and to bring out all their tools. These orders were all carried out, the men not knowing what was going to happen, until the following morning, when the general manager informed the men that all the miners could get for their work was 60 cents per ton, and the men to sign articles making a large deduction from each small car of coal, for dust in slack, also that if miners wished to leave the Coal Co's. service they were to give two weeks' notice, etc. Most of the disgusted miners left the town next day, and are now located in the "Hat" waiting for something to do. Many would return east to their families if they had the means to purchase tickets. On the night of January 20th about sixty miners from Pittsburg arrived at Medicine Hat by a special train, a passenger coach being attached for their convenience. The train went through and disembarked its passengers at Stair, one mile and a half from the mines. These men are under engagement to work in the Saskatchewan mine. Whether they will work for the new price, 60c. per ton, remains to be seen. In the meantime about seven score of the old miners who last week were getting 90c. per ton have remained to work at 60c.

A Mountain of Silver.

An interesting exhibit has been sent from Mexico to the New Orleans Exposition. It consists of a cast of a mountain, made of silver, resting upon a base about five feet long, three and a half feet wide, and eight inches thick. This base is of solid silver, and bears upon each side a medallion of Hidalgo and the words in Spanish: "From the State Ohihuahua to the New Orleans Exposition." The cast of the mountain, which is hollow, but nevertheless massive, is about three and a half feet high. It has two peaks, is quite natural in appearance, is covered with cacti and other Mexican vegetation, and has a party of soldiers sealing its sides and an Indian shooting a deer with a bow and arrow at its base—all cast in silver. This beautiful display of workmanship weighs about three tons, and is valued at \$92,000.

The "Sierra Nevada."

In all the history of human folly in our belief, says the *N. Y. Mining Record*, rarely has anything gone farther in that direction than has the expenditure made by the shareholders of this property since September 1878, when by some inexplicable jugglery, the management at that time succeeded in running up the price of the stock from \$68 to \$270 per share. At that time the sum total of assessments upon the property was \$2,100,000 the fruits of fifty-five swiftly following levies, increased to \$2,400,000 on the 22nd October, 1878. Since that date, no less than forty-five assessments have been levied, aggregating \$3,550,000, which have been drawn from the pockets of the shareholders, making the sum total levied \$5,650,000 to be expended in as bootless and foolish a pursuit as that of the endeavor to square the circle—at least for the stockholders.

THE TOLIMA.—A silver mining company, the stock of which is owned in England and the property of which is in Tolima, one of the States of Columbia, has yielded during the thirteen months ended June 30, 1884, 1,552 $\frac{2}{3}$ tons of silver ore estimated to be worth \$620,313; the ore was shipped to England; cost extraction and exportation was \$371,410. This ore as exported ranged from 373 to 261 ounces the ton; average was 298.08 ounces per ton. Of course, this property pays dividends regularly on 20,000 shares; one dividend, \$1.25 per share, was paid in September and another of the like amount was paid on the 15th of December.

GOLD MINES IN INDIA.

Interest in the India gold properties, which thus far have proved such a lamentable failure, has revived in consequence of the success of the Mysore Gold Company in the Mysore gold-field. From June to November, both inclusive, the Mysore Company crushed 622 tons of rock, which yielded 907 ounces of gold, the result of stamping 121 tons in November being 3 ounces per ton. Several defunct companies in the district, the Ooregum, Nundrydroog, and Madras companies, are making preparations to reorganize, and it almost looks as though, after all, something might come out of the great bubble so disastrously pricked two years ago.—*N. Y. Engineering and Mining Journal*.

A \$50,000 AUSTRALIAN NUGGET.—At one of the tents sat four men—the 10th of June, 1858—talking earnestly of their future and bemoaning the past. For several months these four men had worked together in the same claim, sometimes getting barely sufficient for daily wants; sometimes not even that. For several weeks, indeed, they had labored without any result. Not a speck of the precious metal had they seen. Their credit was stretched to the utmost limit; but until this evening they had hoped, as diggers do hope, that on the morrow something would turn up. Now they had ceased to hope; the storeman had refused further credit, and here they were without either bread or tobacco. "This," said one, "is the last straw." "True," replied another; "we cannot work with empty pipes." "I vote," said a third, "that we go down in the morning for our tools and peg out in some other quarter." After a long and serious discussion this suggestion was decided upon; and early next day, long before the camp was astir, three of the

men descended the old mine, the fourth remaining at the windlass. Down in the mine, the three looked gloomily around, with a kind of sulky regret at having to leave the scene of so much useless toil. "Good-bye," said one, "I'll give you a farewell blow." And raising his pick he struck the vauz, making splinters fly in all directions. His practised eye caught sight of a glittering speck in one of the bits at his feet. Stooping, he examined it and the place he had struck, when, with a loud exclamation, he knelt, and satisfied himself that it was gold! He then commenced picking vigorously. His mates caught the meaning and followed his example. In dead silence they worked on—they had discovered a monster nugget! Then a wild, glad shout sounded in the ears of the one at the windlass, who had sunk into a half dose, feeling, probably, the want of his breakfast. To his inquiry, "What is going on?" the cry came "Wind up" and as he did so there rose to the surface a huge mass of virgin gold. When fully exposed to view, the men were almost insane with joy. After watching it through the day and live-long night, they had it conveyed in safety to the bank. It was named the Welcome stranger, and yielded the fortunate discoverers of it \$50,000. On the site of that spot—within a few yards of which the writer resided—we now find a broad and busy street, a noble temple dedicated to public worship; a free library; and monster marts and warehouses, containing vast stores of the old world's merchandise. The forest and the scrub have disappeared and their place is occupied by the finest city on the celebrated gold fields of Victoria.—From *Cassell's Saturday Journal*.

GOLD NUGGETS.—The largest gold nuggets ever found were said to be as follows:—The Sarah Sands nugget, found at Ballarat, weighed 130 pounds Troy, or 1,560 ounces. This, at £4 pounds per ounce, would be worth £6,140. The Blanche Barkly nugget, dug up at Kingower, weighed 145 pounds, and was worth £6,960. The Welcome nugget, found at Ballarat, weighed 184 pounds and was sold for £9,325. This latter is the largest ever found—a model of the same can be seen at the Geological Museum in Ottawa.

A GOLD FIND.—A story comes from Nottawa, Ontario, to the effect that Mr. Taylor of that place has discovered in the Collingwood mountain what is likely to prove the best gold mine in America, and that he has been offered \$20,000 by a Californian to show him where it is, but he declined, as \$20,000 is nothing to be compared to the wealth that is within his grasp.—*Exchange*.

We are in receipt of a letter from Nottawa on this subject to the effect that Mr. Taylor claims to have discovered gold in the locality above referred to, but owing to the depth of snow he has been unable to make an extended examination of the ground, and is, therefore, unable to say if the gold occurs in paying quantity. It is Mr. Taylor's intention to thoroughly prospect the locality in the early spring, and to test the richness of the vein he has already found.—*Ed.*

The Cleveland Gem.

It is stated that Mr. S. Dessau, of New York, has cut a diamond weighing seventy-eight carats. It has been named "The Cleveland gem," and is said to be the largest diamond ever cut in America. The diamond was found in one of the mines at Kimberly, South Africa, but by

whom is not known. It was smuggled into London and purchased by a syndicate that held it for eight years, until it was purchased by Mr. Dessau. Upon leaving the polisher's hands it will be considered worth \$50,000.

The full text of a paper by Prof. W. Boyd Dawkins, M.A., F.R.S., on the Phosphate Deposits of the Ottawa District, read before the Manchester Geological Society, has just reached us. We regret that want of space has rendered it impossible for us to publish this valuable paper in this issue, but it will appear, *in extenso*, in our March number.

THE METAL MARKET.

Messrs. E. W. Carling & Co., of 16 Philpot Lane, London, England, report under recent date:—

METALS.—There has been little animation in this market except in copper and tin, the former showing increasing business.

COPPER.—Firm, Chili bars, good ordinary brands, cash £48 15s. to £49. 2s. 6d., three months £49 7s. 6d. to £49 15s.

YELLOW METAL.—Sheets, (4x4 ft.) for India, 4 $\frac{1}{2}$ d. to 5d.; sheathing 4 $\frac{1}{2}$ d. to 5 $\frac{1}{2}$ d.

TIN.—Steady, fine foreign, cash; straits, £74 12s. 6d. to £75 2s. 6d.; Australian, £75 2s. 6d. to £75 12s. 6d.; three months, £75 2s. 6d. to £75 12s. 6d.

LEAD.—Flat; English ordinary brands, £11; Spanish, £10 15s.

IRON.—Scotch pig, 42s. 2d. cash; Staffordshire f. o. b.—Bars in London, £6 to £7; nail rods, do., £6 to £7; hoops, do., £7 to £8; sheets, do., £7 10s. to £9.

TIN PLATES.—Charcoal, I C (f. o. b. London), 17s. to 22s.; coke, I C do., 14s. to 17s.

SPELTER.—Foreign, ordinary brands, ex. ship, £14 to £14 5s.

QUICK SILVER.—£6 15s. per bottle.

AUTIMONY.—Regulus, f. o. b., £40.

For the information of those of our readers who have invested in U. S. Mining Stocks we publish the following:

ASSESSMENT DIRECTORY.

(N. Y. Mining Record.)

This table is prepared from the official advertisements published by the organ of the San Francisco Stock Exchange.

[Stocks are sold in New York with assessments paid fifteen days anterior to the date of delinquency at office of the Company, as given in the table below.]

COMPANY.	When levied.	Delin- qu'nt in Board.	Delin- qu'nt in office.	Day of Sale.	Am't.
Kohler S.M. Co. ...	5 Nov. 20	.....	Jan 24	Feb 14	50
Excelsior W. & M. ...	7 Sept 2	.....	Feb 11	Mar 3	50
Scorpion.	19 Dec 1	Jan 1	Jan 23	Feb 13	10
Copper Mountain. ...	1 Dec 3	.....	Jan 13	Feb 10	05
Summers Con.	2 Dec 15	.....	Jan 19	Feb 12	05
Happy Valley B.G. ...	5 Dec 15	.....	Jan 21	Feb 9	08
Silver Lining.	1 Dec 16	.....	Jan 24	Feb 19	07
Utah.	52 Dec 19	Jan 19	Jan 24	Feb 14	50
Black Bear Qtz.	2 Dec 20	.....	Feb 20	Mar 17	25
Virginia Creek H. ...	1 Dec 20	.....	Jan 25	Mar 2	20
S. Bernardino L. L. ...	1 Dec 23	.....	Feb 2	Feb 25	15
Sutter Co. Land.	2 Dec 26	.....	Feb 2	Feb 23	100.00
Omlak.	2 Dec 27	.....	Feb 2	Feb 21	10
Paget S'nd Iron.	10 Dec 30	.....	Jan 30	Mar 6	1.00
Prospect.	10 Dec 31	Jan 31	Feb 2	Feb 18	15
Exchequer.	21 Jan 2	Feb 2	Feb 5	Feb 26	20
Arnold.	3 Jan 3	.....	Feb 7	Mar 2	1.00
Elntracht Gravel.	17 Dec 9	.....	Feb 7	Feb 26	05
El Refugio.	1 Jan 5	.....	Feb 10	Feb 25	30
Silver Hill.	21 Jan 9	Feb 9	Feb 13	Mar 6	05
N. Gould & Curry. ...	8 Jan 12	.....	Feb 13	Mar 2	25
Bulwer Con.	1 Jan 13	Feb 13	Feb 24	Mar 31	21
Peerless.	3 Jan 15	Feb 14	Feb 18	Mar 14	50
Peer.	2 Jan 14	Feb 14	Feb 19	Mar 16	50
Aeme.	8 Jan 14	.....	Feb 20	Mar 13	01
Con. Cal. & Va.	2 Jan 15	Feb 15	Feb 20	Mar 14	20
Martin White.	19 Jan 15	Feb 15	Feb 25	Mar 25	25
Mammoth G. Bar. ...	7 Jan 19	.....	Feb 20	Mar 13	10
Alpha Con.	19 Jan 20	Feb 20	Feb 25	Mar 25	50
Mayflower Gravel.	28 Jan 20	.....	Feb 27	Mar 25	10
Hazard Gravel.	6 Jan 21	.....	Feb 25	Mar 25	05
W. Vancouver C. ...	9 Jan 21	.....	Feb 28	Mar 19	05
Independence.	14 Jan 21	Feb 21	Mar 27	Mar 30	15
Gueva Santa.	5 Jan 22		Feb 27	Mar 19	25

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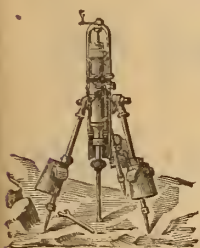
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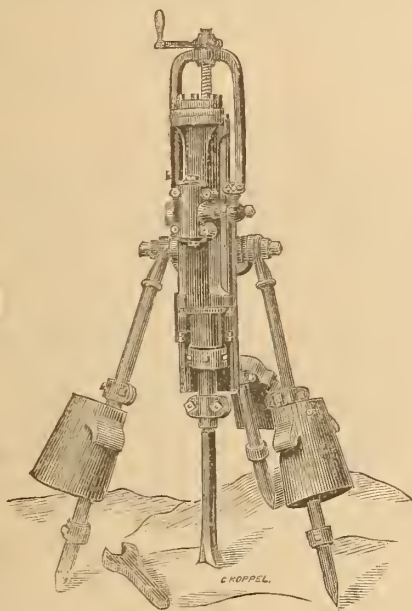
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No. 1 Dynamite

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Strongest and Safest Explosive known, is
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**Notice to Contractors.**

SEALED separate tenders, addressed to the undersigned, and endorsed "Tender for Hot Water Heating Apparatus, Berlin, Ont." will be received at this Department until Monday, 6th Proximo.

Copies of the plan and specification can be seen at the Clerk of Works Office, New Dominion Building, Berlin, Ont., and at this Department, on and after Monday, 23rd inst. Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque, made payable to the order of the Honorable the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party decline to enter into a contract when called upon to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

By order,

A. GOBEIL,
Secretary.

Department of Public Works,
Ottawa, 23rd March, 1885. [16-2]

**NOTICE TO CONTRACTORS.**

SEALED Separate Tenders addressed to the undersigned and endorsed "Tenders for Hot Water Heating Apparatus, Saint Thomas, Ont." will be received at this Department until MONDAY, 6th proximo.

Copies of the plans and specifications can be seen at the office of Edwin Ware, Architect, St. Thomas, Ont., and at this Department, on and after Monday, 23rd inst.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, the blanks properly filled in, and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque made payable to the order of the Honourable the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party decline to enter into a contract when called on to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

By order,

A. GOBEIL,
Secretary.

Department of Public Works,
Ottawa, 23rd March, 1885. [16-2]

PHOSPHATE CRYSTALS.

Farmers, Miners and Prospectors, having unbroken Phosphate Crystals for Sale, can find a cash purchaser by applying at the Office of

THE CANADIAN MINING REVIEW,

Union Chambers, 14 Metcalfe Street, Ottawa.

Parties offering crystals for sale will please mention the colour, length and diameter - large ones preferred.

Mica for Sale.**ABOUT FOUR HUNDRED POUNDS****GOOD QUALITY, DARK MICA**

has been consigned to us for sale. It is cut into sizes 2½x6 to 5x9 inches (the larger sizes predominating) and is offered at a very low price.

Also, ABOUT 2,500 LBS. OF SAME QUALITY IN THE ROUGH SLAB, OR CRYSTAL.

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**NOTICE TO CONTRACTORS.**

SEALED TENDERS, addressed to the undersigned, and endorsed "Tender for Firewood," will be received at this office until Wednesday, the 8th day of April next, at noon, for the supply of Firewood for the use of the Public Buildings, Ottawa, according to the specification to be seen at this office, where forms of tender can also be obtained.

No tender will be considered unless made strictly in accordance with the printed forms, and, in the case of firms, except there are attached the actual signature, occupation and place of residence of each member of the same.

The tender to have the actual signatures of two solvent persons, residents of the Dominion, and willing to become sureties for the due performance of the contract, and to be accompanied by an accepted bank cheque for the sum of five hundred dollars, payable to the order of the Minister of Public Works, Ottawa.

The Department will not be bound to accept the lowest or any tender.

By order,

A. GOBEIL,
Secretary.

Department of Public Works,
Ottawa, 11th March, 1885. }

**INTERNATIONAL AND COLONIAL EXHIBITIONS.****ANTWERP IN 1885-LONDON IN 1886.**

It is the intention to have a Canadian representation at the International Exhibition at Antwerp, commencing in May, 1885, and also at the Colonial and Indian Exhibition in London in 1886.

The Government will defray the cost of freight in conveying Canadian Exhibits to Antwerp, and from Antwerp to London, and also of returning them to Canada in the event of their not being sold.

All Exhibits for Antwerp should be ready for shipment not later than the first week in March next. These Exhibitions, it is believed, will afford favourable opportunity for making known the natural capabilities, and manufacturing and industrial progress of the Dominion.

Circulars and forms containing more particular information may be obtained by letter (post free) addressed to the Department of Agriculture, Ottawa.

By order,

JOHN LOWE,
Secy., Dept of Agric.

Department of Agriculture,
Ottawa, December, 19th, 1884. }

WANTED**A SECOND-HAND****Hoisting Engine**

Of 8 to 10 Horse-power, also

LOCOMOTIVE BOILER.

Of 15 to 20 Horse power.

All must be in good working order.

Address This Office.

Wanted.

A second-hand "Ingersoll" Rock Drill, three inch cylinder, with couplings, &c. Any person having one for sale will please communicate with the publishers of the CANADIAN MINING REVIEW.

**GRAVING DOCK.****BRITISH COLUMBIA.**

SEALED TENDERS, addressed to the undersigned and endorsed "Tender for Caisson, Graving Dock, B.C.," will be received at this office until Monday, the 1st day of June, 1885, inclusively, for the construction, erection and placing in position of a

CAISSON FOR THE GRAVING DOCK

-AT-

ESQUIMALT, B.C.

According to plans and specification to be seen at the Department of Public Works, and on application to the Hon. J. W. Trutch, Victoria, B.C.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, the blanks properly filled in, and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque for the sum of \$2,000, made payable to the order of the Honourable the Minister of Public Works, which will be forfeited if the party decline to enter into a contract when called on to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

By order,

A. GOBEIL,
Secretary.

Department of Public Works,
Ottawa, 11th March, 1885. [16-lawt]

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Section.	Town-ship.	Range- West.	Acres.
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	17	14	23
	15	14	23
	19	14	23
W½ and N. E½	35	14	23
N½ and S. E½	19	15	23
S½ and N. E½	15	16	23
E½ of N. W½	15	16	23
S½	3	17	23
N½	9	15	23
S. W½	31	18	26

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Canadian Mining Review

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The CANADIAN MINING REVIEW is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts as well as others interested in Canadian Mineral Lands are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 20th of the month.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

The mining localities in Canada which are attracting the most attention at the present time are: The Beauce gold district and asbestos mines of the Eastern Townships; the phosphate deposits of the County of Ottawa, and the mica mines, of which special mention is made in this issue; the iron deposits of Central Ontario, and further west in the same province, on the north shore of Lake Superior, the rich gold and silver mines are attracting the attention of capitalists. Capital is being liberally invested in the coal mines of the Northwest Territories and in the petroleum fields contiguous to the Red Deer and Lesser Slave Rivers. Much attention is also being directed to the mineral resources of the Kootenay District in British Columbia where eastern capitalists have already taken up claims with a view to commencing active mining operations in the spring.

The present year promises to be one of unusual activity in the mining centres above referred to—many new and influential companies have been organized to operate the mines and a fair amount of capital is available for that purpose.

In this issue we publish the full text, with illustrations, of a paper by Wm. Boyd Dawkins, M.A., F.R.S., on the Phosphate Deposits of the Ottawa District, read before the Manchester Geological Society. Professor Dawkins is a geologist and mineralogist of high repute in England, and during his visit to Canada last summer with the British Association he took occasion to visit our phosphate mines and devoted

some time to a careful examination of the extent and the nature of the deposits. His opinions, therefore, expressed in the paper referred to, will be of interest to those who are engaged in the industry of phosphate mining.

A variety of mineral specimens collected in the vicinity of Ottawa has been received by Dr. Selwyn, Director of the Geological Survey of Canada, for the International and Colonial Exhibition, which opens at Antwerp in May. A fair representation of the product of the phosphate mines will be exhibited, and an apatite crystal, pronounced by Dr. Selwyn to be the largest ever discovered, has been forwarded by Mr. Allan, of Ottawa. Some very fine plates of Canadian mica, from the Pike Lake and Villeneuve mines, are also among the exhibits.

Lt.-Col. H. Dachesnay, Inspector of Mines for the Chaudiere District, and J. Obalski, Esq., mining engineer for the province, have devoted careful attention during the past year to the mineral products and the occurrence of economic minerals in the section of the country under their supervision. Their official returns are embraced in the annual report for 1884 of the Commissioner of Crown Lands of the Province of Quebec, from which are published extracts in this issue referring to the occurrence of gold, asbestos and petroleum.

The annual report of the Minister of Agriculture for 1884, extracts from which are published in another column, contains special reference to the phosphate industry. It is strongly advocated in the report that the manufacture of super-phosphate should be engaged in in Canada, and in this we firmly concur.

THE *Iron Trade Review*, Cleveland, O., in a recent issue, calling attention to the United States foreign ore competitors, remarks that Canada, as yet, does not appear as a formidable competitor, her shipments for the fiscal year under review being 29,125 tons, though for the calendar year they were about 50,000, but adds that it would not be surprising if Canada's shipments of iron ore into the United States during the fiscal year 1884-5 advanced to 200,000 tons.

Dr. Bell, Assistant Director of the Geological Survey, has been elected a member of the American Institute of Mining Engineers.

Prospecting continues at the Marlow silver location in the Province of Quebec. Four good veins have already been struck ranging from 10 to 20 inches thick, from which samples have been taken that have assayed 20 ounces up to 250 ounces of silver per ton.

The machinery for the Winnipeg and Northwestern Petroleum Company is lying in Winnipeg awaiting transportation to the wells. This machinery is suitable for boring to a depth of 2,800 feet.

Canada's Phosphate Industry.

The activity which has prevailed at the phosphate mines in Ottawa County during the past year continues unabated, and notwithstanding that the market abroad has been more or less sluggish for the past six months or more, there is no disposition on the part of mine owners to check the output of the mines—on the contrary, they are working their properties, in most cases, to their utmost capacity and many thousands of tons of mineral are awaiting transportation. Owing to the construction of the Buckingham branch of the Canadian Pacific Railway, but a small quantity of mineral has been forwarded during the winter months. At the terminus of the railway commodious ore-bins have been erected on the bank of the Du Lievre River to receive the phosphate which will be carried in scows from various points on the river, contiguous to the mines, and with the opening of navigation there will begin a busy scene between the High Falls and the railway terminus. Mr. Lomer, of Montreal, with his usual enterprise, has built a suitable steam tug, which will be available by the time the ice has disappeared from the river, and two scows of seventy-five tons capacity each, to be used exclusively for the transportation of phosphate. Mr. Lomer has contracted to carry the output of the principal mines, adjacent to the river, to the railway at a rate per ton that will greatly reduce the cost of transportation as compared with what it has been formerly. The facilities now offered for forwarding the output of the Du Lievre district from the mines to Montreal are such as to render winter hauling practically unnecessary, and will insure its transportation, irrespective of broken and unfavourable weather, from the opening until the close of navigation, and the cost of delivering phosphate in Montreal is now reduced to a minimum.

It is expected that the quantity of phosphate that will go forward this year will be several thousand tons in excess of last year's production and the quantity that has already been mined, and the present appearance of the mines, justifies such a conclusion. The chief contributors to the general output, and the approximated contribution of each, are:—

The Phosphate of Lime Company, 7,000 tons; Union Phosphate Company, 4,000 tons; Dominion Phosphate Company, 3,000 tons; W. A. Allan, 2,000 tons; Ottawa Phosphate Company, 5,000 tons; Du Lievre River Phosphate Company, 1,500 tons; and Messrs. McLaurin & Blackburn (Templeton), 3,000 tons. If this estimate is approximately correct, with the addition of the output of the less important mines, the production of phosphate in the County of Ottawa for 1885 will doubtless aggregate 28,000 tons. Year by year more attention is being given to careful cobbing, and this season's shipments are likely to be of a higher standard than those of any former year. It is quite certain that a large proportion of the output will run over 80 per cent., while some will go as high as 84 and

85 per cent., notably that from the Little Rapids mine. That this careful dressing of the ore should be kept up is very important, and as mine owners have had sufficient experience now to know how necessary such precaution is, if they wish to secure high prices for their shipments, it is not likely that they will become again careless on this point as they have been in the past.

PHOSPHATE QUOTATIONS.

The most recent advices from abroad quote Canadian phosphate at 1s. 1½d., per unit for 80 per cent., with a fifth of a penny rise, but as there is none offering at these figures this can hardly be quoted as the market price. It is thought that prices will improve with the opening of navigation when phosphate begins to go forward.

ANNUAL MEETING.

The annual meeting of the shareholders of the Intercolonial Coal Mining Company (Limited) took place at the company's office, 199 Commissioner street, Montreal, on the 4th inst. The statements of account for the year ended December 31st, 1884, were submitted to the meeting and considered as very satisfactory. The quantity of coal marketed during that time was 114,882 tons. The following gentlemen were elected directors of the company for the ensuing year:—Messrs. Gilbert Scott, H. A. Budden, Robert Anderson, D. L. Macdougall, James P. Cleghorn, Peter Redpath, Alexander Gunn, Henry J. Tiffin, and W. M. Ramsay. At a subsequent meeting of the board Messrs. Gilbert Scott and Henry A. Budden were re-elected president and vice-president, respectively, and Mr. W. J. Nelson reappointed secretary of the company.

Huronian Mining Co.

A directors' meeting of above company was held at their office in this city on Monday, the 23rd inst., Jas. McLaren, Esq., President, in the chair. The question of continuing or suspending work was discussed. It was finally decided to place the property and plant in the market, not for want of faith in the productiveness of the mine, but for the reason that the distance to the property was too great to enable the directors (all being residents of this city) to give its working the personal supervision necessary to a mine's success.

We look upon this property as one of the most valuable in the Lake Superior district, and already we hear of a syndicate of American capitalists bidding for it.

St. Onge Gold Mining Co.

An organization meeting of above company was held at their offices in Quebec on Thursday, the 26th inst. W. A. Allan, of this city, was elected President. The properties acquired by this company in the Beauce district are being thoroughly and practically developed. Already three shafts have been sunk and the gravel washing at 150 feet from surface has proved very rich. It is the intention of the company to put a large force of men on when the season for washing begins, and we predict ere many months a boom for that district such as California and Australia had in their early gold discovery days.

On Some Deposits of Apatite Near Ottawa, Canada.

By PROFESSOR W. BOYD DAWKINS, M.A., F.R.S.

Read before the Manchester Geological Society, December 2nd, 1884.

1. DESCRIPTION OF MINES VISITED.

The Apatite Mines of Canada deserve more than a casual notice, not merely on account of their economic value, but because of the interesting facts which they yield, throwing light upon the history of mineral veins in general. It was my good fortune in September last to have visited, in company with the Bishop of Ontario and Messrs. Allan, Smith, McIntyre, and Grant,* some of those in the district of Buckingham and Portland, and the following communication to the Society is the result of my observations, combined with those published by Dr. Harrington in the *Report of the Geological Survey of Canada, 1877-78*.

The district to which it refers is that known as the North Ottawa Phosphate Region, and those parts of it which I have examined consist of a cluster of mines on the Rivière du Lièvre, about eighteen miles above Buckingham, a station on the Canadian Pacific Railway to the east of Ottawa.

On getting out of the train at Buckingham, a drive of four miles along a road almost impassable from the depth of the ruts, took us to a tiny wharf and we embarked in a little steam yacht, which swiftly carried us up a noble river, about as broad as the Thames at Richmond, and flowing between bold rocky hills covered with trees glorious in the bright colours of autumn. We land and make our way along a track leading up to one of the wooded spurs, which showed as we left the river behind us, in the large blocks of vein stuff and mica lying in the ruts, that we were approaching the mines. The first vein which we examined is exposed in a shallow working at the outcrop and is filled with massive apatite containing bunches of black mica of the species known as phlogopite. The mine in work some three-quarters of a mile higher up is situated in a vein from twelve to fourteen feet wide, (Fig. 1, No. 3 of the following list), and filled with various materials, apatite, mica, pyroxene, calc-spar, &c., the apatite varying in thickness from two to fourteen feet. The sides of the vein are in some parts clearly defined

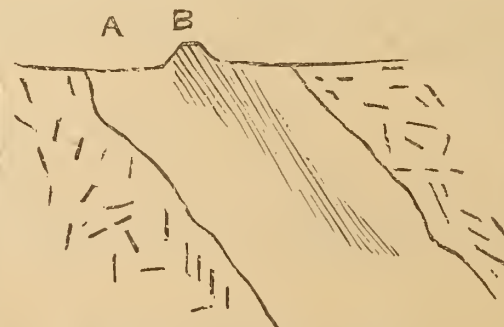


FIG. 1.
Mr. Allan's Mine, No. 3 of list.
A. Apatite and other minerals. B. Mica (Phlogopite).

* I take this opportunity of thanking the three first of these gentlemen for their courtesy in arranging for me to visit the mines and to obtain specimens.

from the surrounding rocks, while in others they shade off into the pyroxenite rock of the district. It is a true fissure vein with a hade of 57° to the East. The workings had been carried on to a depth of about 140 feet from the surface, a greater depth than any other similar mine in the country. They were wet in some places, and the apatite was so decomposed as to take the form of pure sea-green sand, soft enough to be dug out. After examining the outcrop of another vein close by (No. 4 of the subjoined list) we visited the Emerald Mine some two miles away, where open workings had been carried on on a large scale, and galleries had been driven to some distance into the rock. The vein here was from twelve to thirty feet thick, and filled with various minerals, among which apatite and calc-spar predominate. In Fig. 2 a portion of the vein is represented about thirty feet thick, as it appeared on our visit, one side of it being filled with massive apatite, and the rest with calc-spar, in which crystals of apatite, some of gigantic size, were scattered irregularly. Most of the largest and most perfect crystals of

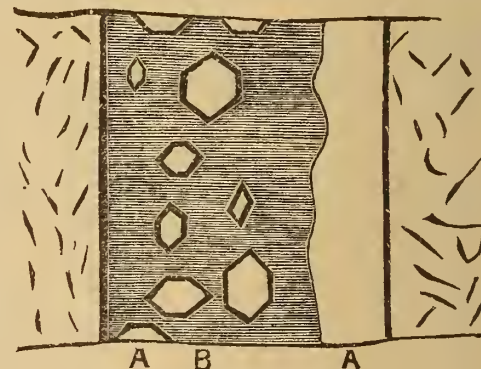


FIG. 2.
Apatite Vein in Emerald Mine.
A. Massive Apatite and Apatite Crystals.
B. Calc-spar.

apatite have been obtained from this mine, some weighing, as Mr. Allan informs me, as much as 1,000 lbs. In one place the vein is intersected by a dyke of igneous rock, probably of dolerite, which is of later age than the vein, since it fills a fault by which the vein has been dislocated.

2. THE DIRECTION OF THE VEINS IN THE NORTH OTTAWA PHOSPHATE REGION.

The apatite veins which I examined, Nos. 3, 4, and 9 of the following list, do not agree in the direction of their strike or bearing, and when they are compared with others in the North Ottawa Phosphate Region described by Dr. Harrington in the Report above quoted, page 6, it will be seen that in the district generally they have no uniform direction. The predominant strikes are East and West, N.E. and N.W. by W.

BEARING OF APATITE VEINS IN NORTH OTTAWA PHOSPHATE REGION.

1. Portland..... N. 15° W.
2. Buckingham..... N. 45° E.
3. Portland..... N. 66° W.
4. "..... N. 40° E.
5. "..... N. 55° W.
6. "..... N. 30° W.
7. "..... N. 15° W.
8. "..... N. 5° W.

9. Portland	E. & W.
10, 11, 12. Templeton	E. & W.
13. Templeton	N. 85° E.
14. "	N. 78° E.
15, 16. "	N. 45° E.
17, 18. "	N. 35° E.
19. "	N. 17° E.
20. "	N. 67° W.
21, 22. "	N. 60° W.
23, 24. "	N. 40° W.

3. THE VEINSTUFF.

The apatite occurs in the veins generally in a massive crystalline form, green, blue, or brown, and sometimes glassy, or granular. It also occurs as large independent crystals shooting from the side of the vein. Sometimes, as in the Emerald mine, the crystals are large, perfect at both ends, and completely enveloped in calc-spar. It contains, according to Mr. Hoffman's analysis, tribasic phosphate of lime, 85.241* to 89.810; fluoride of calcium, 5.860 to 7.929, besides other constituents, for which reference may be made to the *Report of the Geological Survey of Canada*, 1877-8, p. 10 B. In comparison with European apatites it stands thus:—

Tribasic Phosphate of Lime, Arendal, Norway.....	92.189
" " " Greiner, Tyrol.....	92.160
" " " Murcia, Spain.....	92.066
" " " Tokovaia, Ural.....	9.668
" " " Studianka, Russia.....	91.646
" " " Ottawa, mean of 7 analyses.....	87.521
" " " Estremadura, Spain, mean of 2 analyses.....	81.593
" " " Staffell, Nassau.....	70.273

It is, therefore, a high-class and valuable mineral, and, in my opinion, is one of the most important of the mineral resources of Canada.

The calc-spar is coarsely granular, white or flesh-coloured, and intimately associated with the apatite, sometimes completely surrounding the crystals, and at others forming alternate layers. In some cases, as in the specimen on the table, it has a stalagmitic surface, and in others has been deposited along with quartz and other minerals in drusy cavities.

The mica, of the phlogopite species, and dark in colour, is also intimately associated with the apatite, sometimes being in large masses in the centre of the vein, or in others lining the sides of the vein, or coating the crystals of apatite. Among other minerals which I observed in the vein-stuff were pyroxene, zinc-blende, and pyrite both in cubes and in octohedra. For further details as to the minerals associated with apatite, reference may be made to Dr. Harrington's admirable essay.

4. THE ROCKS TRAVERSED BY THE VEINS.

The rock (Pyroxenite of Hunt=Hypersthenite of Dana) traversed by the veins which I examined consists of a bright crystalline and massive schist, composed to a large extent of pyroxene (augite), more or less altered, mica, orthoclase, trichloric feldspar, and apatite. It contains, according to Dr. Harrington, subordinate layers of quartz. Were it not that it is bedded it would pass muster as an eruptive rock.

Looking, however, at that fact, and the further consideration that it is associated with quartzites and altered limestones, it is, in my opinion, an altered rock belonging to the Archaean (Laurentian) series, which ranges over the vast region north of the Lakes and of the St. Lawrence River, and which, according to Sir W. Dawson, is not less than 30,000 feet in thickness. In classification it goes with the Laurentian hornblende gneisses. According to Dr. Harrington, both limestones and quartzites are traversed by veins of apatite in the North Ottawa Phosphate Region at Templeton, which I had no time to visit.

5. HISTORY OF THE VEINS.

In dealing with the very much debated question as to the history of the apatite veins, the following points seem to me the most important:—

(a) The veins are in some cases sharply defined, and have evidently been deposited in a series of irregular fissures striking across the rock in various directions. (See Figs. 1 and 2.) Sometimes the vein-stuff shades off in the pyroxenite, as it might reasonably be expected to shade off on the hypothesis that the deposit took place under conditions of heat and enormous pressure in the presence of water. These conditions are proved to have existed from the profound alteration of the Archaean rocks from the fragmental to the crystalline state.

(b) The character of the vein-stuff is such as is usually found in fissure-veins. In Fig. 3 it presents a banded structure, formed by alternate layers of apatite and pyroxene. In other

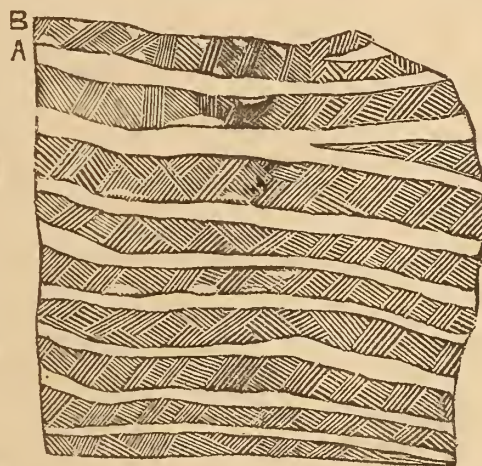


FIG. 3.
Vein stuff from No. 3, nat. size, Portland.
A. Apatite. B. Pyroxene.

cases layers of apatite and of a stalagmitic calcite alternate, and in one specimen on the table an angular fragment of quartzite is enveloped in vein-stuff composed of mica, pyroxene, and apatite. These two characters are found together, so far as I know, only in true fissure veins, and are well known to practical workers in mineral veins generally.

(c) The apatite occurs disseminated through the pyroxenite rock in minute granules, and it is therefore argued that it has found its way into the veins by a mere process of segregation. It seems to me more probable that both rocks and veins have received their charge from some

common deep-seated source by hydrothermal action, while both were sunk deep beneath the surface, and the heat and pressure were sufficient to allow of apatite and the other minerals in the vein being deposited by water.

(d) The surfaces of some of the crystals of apatite present traces of hydrothermal action in their rounded angles and honeycombed surfaces, as in the specimens on the table. Solution might very well go on in one place while deposition was going on in another. The presence, too, of perfect crystals of apatite completely embedded in calc-spar, as in Fig. 2, can only be accounted for on the hypothesis that the vein was filled with a pasty mixture of apatite and calcite which allowed of the former developing a perfect crystalline form, the calc-spar matrix being sufficiently compact to keep the growing crystal from sinking to the bottom of the fissure. Had the fissure been empty the apatite crystals in this case, as in most others, would have been imperfect, and would spring from the side of the vein. This pasty condition of the vein-stuff is only explicable, in my belief, by hydrothermal or aqueo-igneous action.

(e) Nor are we without proof that the vein-stuff itself has been in a state of movement while it was in a pasty state in the crumpling and distortion to which the crystals of mica have been subjected. The specimens on the table have been obviously distorted by the movement of the surrounding matrix after their development as crystals.

From these facts it may be concluded that the veins of apatite in this district were formed in fissures in the Archaean rocks by hydrothermal or aqueo-igneous action under conditions of heat and pressure of the same general sort as that by which the rocks themselves have been affected, and by which the sandstones have been converted into quartzites, the muds and sandy clays into schists and crystalline rocks and the limestones into crystalline calcite associated with serpentine.

These impressions of a hasty visit to the district in question are laid before the Society not merely because they relate to a large and rapidly developing mining industry in Canada—the export last year being 14,478 tons, and the estimate for this being 23,000 tons—but because they are of local interest, since the products are largely used in Lancashire.

The following note relating to the physical characters of this important mineral, and the localities where it occurs in the British Isles, is added for the information of those who may seek for it:—"Apatite, crystalline phosphate of lime. Hexagonal, often hemihedral, occurs in six-sided prisms terminated by one or more planes, or the prism is terminated by a six-sided pyramid, and the lateral edges are sometimes replaced. Colours usually pale, and most commonly white, yellowish white, wine yellow, green, blue, or bluish green, and red, which are sometimes intermixed in the same crystal.

* The lower percentage, 74.241 of his analysis, No. 7, seems to be taken from an impure sample, and to be an exception to the rest of his results.

Externally it is splendent; internally the lustre is shining and resinous, approaching to vitreous. Transparent to opaque: cross fractures uneven, approaching to small conchoidal. Hardness, 5. Specific gravity, 3.25.

Blow-pipe.—Fusible with difficulty on the edges: with borax forms a clear globule, and in salt of phosphorous dissolves in great quantity, affording a transparent glass, which, when nearly saturated, becomes opaque on cooling, and presents crystalline faces."

Localities.—*English*: Cornwall, of a greyish-blue, at Stenna Gwynne, near St. Austell; St. Michael's Mount; Huel Kind, near St. Agnes; Fowey Consols and Huel France, near Tavistock. Cumberland, at the foot of Brandygill, Carrock Fells. Devonshire, at Bovey Tracey, in crystals sometimes two inches long, associated with black tourmaline. *Scotch*: Dee side, in Aberdeenshire. *Irish*: Near Kilroot, Co. Antrim, in granite; near Hilltown, Dublin; and at Killiney Hill, in limestone. *Bristow's Glossary of Mineralogy*. It has not yet been discovered in paying quantities in the British Isles.

The Late Sir William Edmond Logan.

On the 26th of March Dr. Bell, assistant director and the senior geologist of the staff of the Canadian survey, delivered a lecture before a large audience in Montreal on "Personal Reminiscences of the late Sir W. E. Logan." Dr. Bell had been obliged to postpone the lecture, which was one of the Somerville course in connection with the Natural History Society, on account of a severe cold, and in the meantime he kindly gave a rehearsal of it in St. James' hall in Ottawa on the 10th instant, at the request of the staff of the survey and other citizens. As the subject is one which we are sure interests our readers we give the following report of the lecture:—The history of the Geological survey of Canada was inseparably connected with that of the life of Sir William Logan. This survey owed its origin to representations made by the Natural History Society of Montreal and the Literary and Historical Society of Quebec. Acting on these, the first Parliament of the united provinces of Upper and Lower Canada voted £1,500 sterling to commence the work and Mr. Logan was appointed Provincial Geologist in 1842. Subsequently the grant was increased to £2,000 annually, but it was not till near the close of Logan's administration that the amount exceeded \$20,000 a year, and the average annual grant during his time may be said to have been only about \$15,000. This fact should be borne in mind when we consider the great things which Logan accomplished.

The lecturer did not propose to give a history of Logan's life, which had been well done by Dr. Harrington, nor did he intend giving a description of his personal qualities, but would relate a series of incidents and anecdotes illustrative of the principal points in a man's character, and leave each to form his own judgment. Dr. Bell's connection with the survey began early in 1857, and he was associated with Sir William from that time until the latter left the country, a period of 17 years, during which he had opportunities of seeing him under a great variety of circumstances.

Logan's ardent devotion to duty both in the office and the field were well calculated to inspire enthusiasm in others, and thus a large amount of work was performed by the small staff. Even in the city he commenced his labors early in the morning, and after a short interval for breakfast continued without intermission till six in the evening, when he dined, returning to the office again and working till past midnight. In addition to his daily or more frequent round of visits to every member of the staff, he kept all the accounts with his own hand, carried on an extensive correspondence, plotted the surveys he had made during the summer, and constructed his own original maps, wrote his reports, revised those of his assistants, examined all the fossils, minerals and rock-specimens collected during the year, studied the reports of other geological surveys and the new geological books generally, while the interruptions caused by visitors, to whom he was always accessible, occupied a considerable part of every day. For a number of years four manuscript copies of the various annual reports required to be made in order to comply with the requirements of the time, and all these Sir William Logan wrote out with his own hand, a task requiring the utmost patience to endure.

The room in the survey building in Montreal in which most of Sir William's work was performed, and which also served him for a bedroom, was plainly and scantily furnished. It had no carpet on the floor, no screen or curtain at its single window, while his camp blankets, spread on a folding chair, served him for a bed. Some of his field instruments and the clothes he wore in camp might be seen hanging on pegs around the wall. He paid little attention to dress even in the city, and he made the same coat and waistcoat wear for so many years that they seemed as familiar to his friends as the man himself. Owing to his unpretending dress and style he escaped recognition even by many old citizens of Montreal. When working in the country he put up at the farm houses and wayside taverns and paid so little attention to his personal appearance that strangers would scarcely believe he was Sir William Logan at all. Several very amusing anecdotes were here related by the lecturer, showing the mistakes and inconvenience which arose from his "seedy" appearance. These stories will not bear condensing, and we only regret that we have not space to give them at length. Some laughable accounts were next given of how, on various occasions, he had been treated as a lunatic from ignorant people not comprehending his motives and actions.

Wherever he walked in the country (and he seldom hired a conveyance) he counted his steps and took bearings of the road or of his track by compass, and in this way surveyed thousands of linear miles more accurately than would be supposed possible. His field books show the great care with which he noted and sketched the features he would represent on his maps. His instrumental surveys were models of accuracy, and several instances were given of the great care with which he performed these surveys. He was not only a first-class topographical surveyor, but a very neat and skilful draughtsman, as proved by his maps. Among the surveys which he performed were that of the Ottawa river, a traverse of the Gaspé peninsula, a great part of the county of Argenteuil, the region opposite the city of Quebec, the neighborhood of Missisquoi bay, the townships around Richmond and Danville, two whole summers having been spent in a single township. These and other surveys which were referred to, combined both the topography and the geology, and the great pains which Logan always took to

secure accuracy, gives everyone the fullest confidence in his results. In 1862, when a person by the name of Marcon called in question the work of some of Sir William's assistants, he took up the cudgels in their behalf, as he always did, and effectually repelled the accusation. This was one of the causes of the noted *esprit de corps* of the survey in Logan's time. Other causes of this feeling were his sense of justice, the care with which he kept his word, and the pride he took in his staff, simply because they were his own men. He did all he could in their behalf, and they in return supported him and aided very materially in building up his great reputation. A number of instances were given of Logan's carefulness in matters of detail and in looking after the welfare of his assistants. He took pleasure in giving them full credit for their labors and was lenient to their failings.

In the field, whether in settled districts or in the woods, the amount of physical labor which Logan underwent was very great. When working miles away he never thought of his boarding place or his camp until compelled by the darkness to close his note-book and walk back to his supper and bed. After his evening meal, instead of taking his much-needed rest, he would spend hours plotting his maps.

As to religious matters, Logan made no parade of piety, although his everyday life was an exemplification of practical religion. He treated the clergy of all denominations with much respect and among them were many of his principal friends. His parents belonged to St. Gabriel (Presbyterian) church and Sir William used to tell an amusing story of how, when a very small boy, he grabbed the coppers on the collection plate the first time they took him to that place of worship. Logan did not believe in indiscriminate generosity, but the lecturer mentioned several instances proving that he was kind hearted and a gentleman of refined feelings. He was not a time-server nor a respecter of persons, but observed the same respect for the feelings of all. On the occasion of Her Majesty's visit to the Canadian section of the International Exhibition of 1855, the Queen was much pleased with his charming conversation, and his sincere and independent manner, and shortly afterwards she conferred on him the honor of knighthood for his great services to science and his native Canada.

Sir William remained a bachelor, although from the anecdotes related by the lecturer of the interest the ladies took in him, it would appear that he might have found a wife had he desired to do so. He was not, however, by any means unsociable, and his good stories, songs and jokes always made him the centre of attraction. He was as ready-witted as Sir John Macdonald, and had something appropriate to say for every occasion. No one enjoyed a little harmless fun more than he, nor sympathised more heartily with the youthful frolics of his assistants or men, as we may judge from the illustrations recited by the lecturer. His keen sense of humor induced him occasionally to participate in practical jokes at his own expense.

During Logan's lifetime, Marcou was his chief detractor, but since his death Whitney, Wadsworth and others have assailed his reputation. If some who might take his part seemed indifferent, he had in the lecturer one witness, at all events, ready to stand up for him. While multitudes of "self-seeking" reputation hunters went to their graves "unwept, unhonored and unsung," Sir William Logan's death was keenly felt by thousands, and his memory would be ever green in the hearts of those who knew and loved him.

PHOSPHATE OF LIME.

FROM THE ANNUAL REPORT OF THE MINISTER
OF AGRICULTURE FOR 1884.

In my report last year especial attention was directed to the importance of the phosphate trade, and the proportions it promised to assume in the near future. Attention was called to the fact that Americans were carefully looking after property in Canada where they could obtain the raw material, and this desire on their part is being still more strongly evidenced. Canadian phosphate maintains its position in the markets abroad, and the output during the past year has been large. Some 23,000 tons of this material were shipped from Montreal in 1884, against 19,000 tons in 1883. Of this amount, the mines of Ottawa County furnished 20,353 tons, whilst the balance went from the section of country lying north of Kingston, the only two localities in which this mineral is worked. The season has proved favorable to those engaged in the phosphate trade. Prof. Boyd Dawkins, an eminent geologist, who, when out here with the British Association, visited the Ottawa County mines last autumn, stated, in a paper read by him at Manchester, on his return, that in his opinion phosphate was "one of the most important resources of Canada." The effects of this industry on the country generally, and especially those districts where its mining is carried on, are most beneficial, as the capital expended by its agency is considerable.

The use of this material as a fertilizer, when converted into superphosphate, cannot be too strongly urged on our farming population, and the advantages it offers in renewing lands worn out by perpetual cropping, in the absence of ordinary manure, the want of which is too often apparent in districts where cattle raising is not carried on, cannot be too often impressed. In those parts of Europe where the sugar beet is largely grown—Belgium and Denmark, for instance—no fertilizer has been found equal to phosphate, and the same remark might well be applied to the grain producing farms of our older Provinces. The rigid inspection to which the crude material is subjected in England tends greatly to keep up the standard of our shipments, and the high percentage of Canadian phosphate will always secure for it a foremost place and an eager demand. Prof. Dawkins, comparing the phosphate obtained from various countries, states the percentage that Canada yields out of a mean of analyses, is 87.52 of tribasic phosphate of lime.

The question has not yet been solved whether the raw material pulverized will give beneficial results to the soil by its application, and till this fact has been ascertained the crude phosphate will continue to be shipped to the place of manufacture. The establishment of works for its conversion into superphosphate, contiguous to the natural deposits, would prove of immense advantage, as the material thus converted would be far more likely to be made use of by our resident agriculturalists, and the transport of bulky phosphate would be resolved into shipment of a substance commanding a far higher price. The advantages obtained by foreign manufacturers would in that case be gained by Canada, and an industry might be added to those already existing, which would materially add to our prosperity.

From information obtained, it is expected that the output of phosphate in 1885 will be much larger than in any previous year, as great improvements have been made at the mines,

and appliances have been brought to bear by the various companies working them which will materially aid their efforts, and add largely to the products hitherto obtained by imperfect means.

It seems to me a matter of regret that no definite action has yet been taken in regard to the conversion of crude phosphate into superphosphate ready for use. If the manufacture of the prepared fertilizer was carried on in Canada, much larger returns would be obtained for the shipments of it made to Europe, and a considerable saving would occur in the cost of freight, as under the present conditions, however carefully the system of collecting the crude material is carried on, there are still quantities of foreign matter associated with it, which are valueless when separated by the manufacturer. I have ascertained that the mineral from which the acid requisite for the converting of phosphate into superphosphate could be extracted, is present in proximity to the phosphate itself, but no steps appear to have been taken towards the manufacture of this commodity, either for home use or for foreign export. I am, however, in hopes that with the attention the phosphate mines have received within the past year, both from members of the British Association who visited them, as well as from capitalists with a view to investment, and as the output of the crude material increases with the development of new mines, this important question of its conversion into a form ready at once for the use to which it is to be applied, will occupy the serious attention either of those at present engaged in phosphate mining, or of those who might make its manufacture a separate branch of industry. It is almost needless for me to add that the establishment of such works amongst us would further recommend itself as being another means for furnishing employment to the labour of our own country.

APPENDED TO THE MINISTER'S REPORT IS THAT OF THE GOVERNMENT AGENT AT LIVERPOOL, from which we extract the following:

The quantity of mineral phosphates imported this season from Canada is estimated at 20,460 tons, which is an increase of 3,000 to 4,000 tons on last year, and exceeds that of any previous year since phosphates have been exported from Canada. The quality has also improved, although much more could be done in dressing at the mines to improve it. Prices have scarcely been maintained this year, 70 per cent. having touched 9½d. per unit, ex ship at Liverpool; 75 per cent., 11d., whilst 80 per cent. has not been offering. Other imports have been pretty equal to the previous year, especially Charleston land phosphates, which have been selling ex ship delivered U.K. port at 11d. Belgian phosphates have come in pretty freely and continue to sell at very low prices, both for present and next year's delivery. Spain has not forwarded so large a quantity this year, on account of temporary suspension of some of the mines, but it is expected that the imports from that quarter will be quite up to the average next year. Prices of phosphates are considerably low, notwithstanding the increased demand, therefore a decided improvement may reasonably be expected.

The total value of Canadian mine products in 1884 was \$3,247,092, while that of 1883 reached but \$2,970,886.

Lead veins are thickest in limestone, thinner in sandstone, and thinnest in slate. The latter, however, contains the greatest percentage of silver.

MICA MINING IN CANADA.

The most important mines in operation at present are the *Pike Lake* mine, in Burgess, and the *Villeneuve* mine in the county of Ottawa. The former is becoming more and more productive, and during the past month has yielded abundantly. The crystals at the *Pike Lake* mine are, in many cases, of enormous size, numbers of them being capable of producing plates twelve inches square. From some of them even larger dimensions have been obtained. Shipments are being made monthly from the mine, and although but a small force of miners is employed, the yield is sufficient to supply a large demand and the property is being worked at a large profit.

The *Villeneuve* mine has not yet been developed to the same extent as *Pike Lake*, but a large quantity of mica of very excellent quality is being taken out. As development proceeds the crystals are found to increase in size and to be more regularly formed. Several hundred pounds of merchantable mica have already been taken out and await transportation. The output is increasing daily, and the product of this mine will be sufficient to supply a fair portion of the demand for Canadian consumption.

These two mines are being steadily worked under the management of practical men, and shipments of mica, cut and ready for the market, will be made each month hereafter.

GOLD MINING IN BEAUCE.

During the past year there has been a marked revival of interest in the alluvial gold deposits in the Beauce district, and quartz mining has started up with encouraging results, both quartz and alluvial mining promising to become permanent and very remunerative industries. The annual report of the Commissioner of Crown Lands for the Province of Quebec, for 1884, embraces the report of the Inspector of Mines for this district, which contains interesting information regarding the operations of the several companies and individuals engaged in gold mining in the various localities in the Beauce district. The inspector reports that although the year 1884 has not witnessed any great revival of the mining industry in the Beauce gold region, those who have continued their operations have been much encouraged by the results obtained in the alluvial mines, while those who have begun the opening up of quartz veins have found immense beds containing both gold and silver in paying quantities.

The Canada Gold Company, for instance, spent the greater part of the season in sinking nine trial shafts in as many different veins of quartz, and with the knowledge so acquired can now proceed intelligently in the development of their immense property. The fact of their acting with so much precaution should not be regretted, for although the working of the mines in this part of Rigaud Vaudreuil has thereby been retarded for a year, it may prove to have been in the interest of the province as well as in that of the company. For if work had been begun without previous examination upon any quartz vein whatever and the result had proved unfavourable what a bad effect it would have had upon the character of their valley as a gold-bearing district!

Messrs. Fenton and Dupuy also devoted the whole of the summer and part of the autumn to prospecting operations in the upper quartz region, and say that they found some very rich veins in the high lands of the township of Cranbourne.

Captain Richards continued throughout the season to work upon his alluvial claim in the St. Charles concession of Rigaud Vandreuil, and was preparing to begin operations in January upon the quartz lode known as the Loubier vein in the first range of St. Francis. A specimen of the quartz from this vein sent to New York yielded, according to the official report of Mr. Michel, at the rate of \$15 in gold and \$22 in silver to the ton; and upon another assay by Mr. Calvin appeared to contain \$106 worth of gold per ton.

Several companies of miners had also been washing on the Gilbert last year; among others, McRae & Co., O. Dion, C. Corpal & Co., H. Powers & Co., and if they have not made fortunes, which would have been surprising with the means employed, they at least had many excellent days.

Messrs. McArthur Brothers, who for a long time worked with success upon the old St. Onge claim in the same St. Charles concession, but had suspended operations during the progress of the suit respecting mining rights, have passed a lease with the proprietors and will soon be at work again.

At the River des Plantes the "Canadian Co." did a large amount of work last summer, and are excavating a tunnel and drain which will enable them to reach and work the bed of auriferous gravel so deeply buried under the steep banks of this river, which flows entirely over rocks of the lower Silurian strata about a mile north of the limit of the upper Silurian formation, where the Gilbert has its course.

At St. George, Messrs. Allan & Humphrey, having acquired the property of Messrs. St. Onge & Brothers, had the misfortune to lose their third shaft, which, at a depth of 154 feet, had just reached the surface of the gravel. This loss is attributed to two thick beds of very fine sand through which the shaft passed. They have gone to work again upon a new system, and having already overcome all difficulty, expect to reach their goal within a short time. The new shaft is only a few feet distant from the old one, so there is no doubt it will strike the same bed of gravel, a single pan of which taken from its surface, on the very day the old shaft was abandoned, yielded thirty-six particles of gold.

About twenty miles from the last-mentioned workings is situated the famous Armstrong mine in the valley of the River du Loup. Assays of specimens from this mine made at Quebec, in France and the United States attribute to the mineral an enormous value both in gold and silver, some of them yielding at the rate of over seven hundred dollars a ton. Pieces of quartz taken from the vein contain gold visible to the naked eye. Prospecting operations were resumed at this mine in November last under the direction of Mr. J. Fraser Torrance, a competent mining engineer, on account of a Canadian capitalist whose purse is always open for the assistance of enterprises of a sensible and patriotic character.

ASBESTOS MINING IN CANADA

This industry is carried on to a large extent in the townships of Coleraine, Thetford and Broughton, in the county of Megantic. Asbestos was originally discovered in 1877, in the township of Ireland, and the first workings were begun in the following year by Messrs. Johnston and Irvine, in Thetford. This branch of mining has advanced since then with giant strides, and between May and November of last year over 1,200 tons of asbestos were taken out of the seven mines in operation in Thetford and Coleraine alone. An eighth mine, in the

seventh range of Broughton, was also successfully worked and disposed of at a high price; while yet another was opened late in the fall in the sixth range.

As many as five hundred men were employed during last summer in these different mines.

The Government Inspector of Mines for the district reports that the mines or quarries appear to be inexhaustible; that they can give employment to thousands of workmen, that they can be worked with small capital; and that they have hitherto paid at the rate of a hundred per cent.; also, that the market cannot be overstocked as the supply is not equal to the demand from England, France, Germany, Italy and the United States. The ruling price obtained for the output of these mines last year was \$80 per ton. New uses for asbestos are being found every day, and Mr. Montpetit, in his excellent pamphlet, "*L'amiante c'est le million*," mentions the following: cloth, cordage, thread, packing for steam engines, paint, paper, pasteboard; it is used, he says, for lining crucibles, blast-furnaces and safes. In addition to this long list, it may be stated that for joints in water-pipes, or covering hot air conductors, it has no equal; that it renders buildings comparatively fire-proof when woven into sheets only one twenty-fourth of an inch in thickness and spread over the floors and stretched on the partitions like paper-hangings;—that it would render similar service in theatres, and that a fireman, completely clad in asbestos, with openings for the eyes protected by mica, might defy the flames.

This industry in the Eastern Townships has become one of much importance and the extent of the deposits renders it susceptible of increasing into one of great magnitude. It is expected that the output of the approaching season will be greatly in excess of that of any former year and the mineral has gained a world wide reputation for its excellent quality as compared with that mined in any other part of the world.

GYPSUM IN CANADA.

It may not be generally known how largely this useful mineral is developed in various regions in the Dominion and Newfoundland. In the latter province it forms high banks at Great Codroy Harbor, near Cape Ray, and at several places on the shore of St. George's Bay, some of it being of a white color, suitable for making stucco. In Cape Breton it is found all around the shores of Bras d'Or Lake, and on the outer shores at Lennox Passage, as well as along the Strait of Canso in the southern part of the island. In the same island it is abundant on the Gulf of St. Lawrence side, at St. Ann's Harbor, Mabou, Margaree and other places. Heretofore it has been shipped principally from Plaster Mines on Bras d'Or Lake, Baddeck, Lennox Passage and St. Ann's Harbor, but formerly large quantities were sent from Mabou. Great quantities of gypsum occur on the mainland of Nova Scotia near the Minas Basin, and it is largely shipped from the Port of Windsor. Large deposits are also found in the eastern part of New Brunswick, the principal shipping point being Hillsborough, on the Peticodiac River. The mineral is common on the Magdalen Islands, which belong to the County of Gaspé, but it is mostly of a gray color. In all these localities in the Lower Provinces the gypsum occurs in strata belonging to the Lower Carboniferous series. Comparatively small deposits of gypsum are met with along the Grand River, in Ontario, in the Onondaga formation. Being in an agricultural region, where it is in demand for land plaster, it has

been mined more or less at Paris, York, Caledonia, Cayuga, Oneida, Mount Healy, &c. Much of it is white enough to be calcined for stucco, &c. Beds of gypsum have been found in boring for salt in the Kincardine and Goderich regions, where it occurs in the Onondaga formation also, but which is there overlaid by the Corniferous. Gypsum may be struck in borings anywhere in Ontario south-westward of a line drawn from the mouth of the Grand River, on Lake Erie, to the mouth of the Saugeen River, on Lake Huron.

To the north of the Great Lakes, gypsum is found in considerable quantities, at the White Banks on the Moose River; and it is reported to occur near the shore of James' Bay, between Moose Factory and Fort Albany. Traces of the mineral have been found near the south-west side of Lake Nipigon.

In the North-West Territories small quantities have been discovered in the Riding Mountains, and nodules and crystals may be found in the Cretaceous clays and marls in almost any locality throughout the North-West where these crop out. Ignorant people mistake the clear laminated crystals of selenite for white mica, and many a sensational story of mica discoveries has thus arisen.

At Peace Point on the north side of the Lower Peace River about 60 miles W.N.W. of Fort Chipewyan, on Athabasca Lake, the cliffs are about half composed of gypsum. Loose specimens of the mineral have also been picked up at the falls of Peace River, about 160 miles from its mouth.

Gypsum is also reported to be abundant just west of the great natural salt deposits of Salt River, on the west side of Slave River, about half way from Athabasca Lake to Great Slave Lake.

PETROLEUM.

INDICATIONS OF ITS EXISTENCE IN THE PROVINCE OF QUEBEC DESCRIBED BY MR. J. OBALSKI, GOVERNMENT MINING ENGINEER, IN HIS REPORT TO THE COMMISSIONER OF CROWN LANDS.

Mr. Obalski in referring to these very important indications says:

In my study of the mineral products of the Province of Quebec, I have had occasion to remark a fact which appears to me of great importance. In the district about Three Rivers, that is, in the south part of the counties of Champlain, St. Maurice, Maskinongé, Berthier, Joliette, &c., some very considerable emanations of combustible gas have been noticed ever since the country has been inhabited. The places where these have been known to occur are St. Maurice, Pointe du Lac, Louiseville, St. Léon, Epiphanie, St. Paul, l'Hermite, St. Henri de Masconche, &c., and on the south shore, St. Gregoire, county of Nicolet.

This gas has certainly some origin, which should be found in the petroliferous deposits existing in the subsoil. The country has been inhabited for over a hundred years, and it may be reasonably supposed that the same effects were produced long before. Dr. Dancé, of Louiseville, has collected at a single point, which he calls the St. Peter well, as much as 8,000 cubic feet in twenty-four hours; and the same may be done at a number of points within a comparatively small space. It therefore seems to be rational to suppose that there exist large quantities of petroleum from which this gas is continually being formed, if there are not immense accumulations of gas of undiscoverable

origin, unless, indeed, it arises from solid matter.

These facts acquire greater importance when it is considered that on the whole of the north shore of the St. Lawrence between Québec and Montreal, there exists a rocky formation called the Trenton limestone, and that wherever that limestone appears at the surface, as the *Pointe aux Trembles*, River à La Rose, Chateau Richer, &c., the cavities in it are seen to be filled with small quantities of veritable petroleum: that bituminous schists are found at River à La Rose, and other points; and finally that at certain points in a lower formation we find thin veins of a substance resembling anthracite, as at the Island of Orleans, Levis, St. Appolinaire, &c.

All these facts taken together tend to prove the existence in this region of substances whose base is carbon. Besides, the official geologists of the Federal government recognized the possibility, and even the probability of the existence of petroleum in this formation. Dr. Sterry Hunt, in his report for 1866, page 262, says: "The limestones of this formation may in some localities prove to be valuable sources of petroleum."

Sir W. Logan, in the Geology of Canada, 1863, page 136, says "the possibility of its occurrence in available quantities in some parts of the Trenton formation should not be lost sight of."

Considerable quantities of it have been found in the same formation in the Manitoulin Islands, province of Ontario.

It has been proved by investigation that petroleum can be found in considerable quantities only where the subterranean strata have been so folded or disposed as to form pockets or cavities in which it might accumulate. The incomplete study of the country yet made has not established the occurrence of such foldings in the strata, but in my opinion they may be presumed from the nature of the surface indications; and I consider that it would be highly advisable to have some borings made so as to discover the origin of the gaseous emanations above mentioned. It is possible that a cavity might be struck at the first attempt, but in any case it would be necessary to sink a certain number of trial wells, and a company spending about \$10,000 in this work would, I think, arrive at some definite result.

Attention is directed to another locality where Mr. Obalski observed strong evidences of the petroleum and on which he reports as follows:

Throughout the whole of the region comprised between *St. Paul l'Hermite*, *l'Epiphanie* and *St. Henri de Mascouche*, emanations of combustible gas have long been known to occur, often rising from the ground in the company of salt springs. These emanations are similar to those which I have mentioned on several previous occasions, and arise from the same source; that is to say, I believe they are all due to the presence of bodies of petroleum in the subterranean limestone. The conformation of the land and other indications are the same as those at the places previously examined.

At the place called *Cabane Ronde*, on the land No. 3 of the cadastre of St. Henri de Mascouche, Messrs. Renaud Brothers and Dubois, began a boring of three inches in diameter. They traversed a bed fifty-four feet thick of blue, yellow and red clay, then sixteen feet of black sand and coarse gravel, and finally struck the schist rock at a depth of seventy feet. During the whole of the time the work was going on the escape of gas was regular and abundant. Operations were begun in the autumn of 1883, and resumed in the spring of this year. A remarkable circumstance, worthy of being recorded, then occurred. At the beginning of

June, on inserting the drill, the workmen met with a resistance which the efforts of four men were unable to overcome, and withdrew the instrument, upon which a violent gush of matter from the opening took place. For forty-eight hours, as I was told by the witnesses of the scene, a column of liquid, gas and stones could be seen issuing to a height of over fifty feet. The gas was of the same character as that previously reported on; the water very salt; and the stones, some of which were half the size of a man's fist, were composed of quartzites, limestones, black bituminous schists, various kinds of granite, &c., and generally in the shape of rounded pebbles. I was further informed that at the beginning of the discharge, a score or so of oily drops of petroleum were observed to fall, but were not gathered, as it was hoped that a larger quantity would be forthcoming. The boring has since been continued, but more slowly on account of the hardness of the rock.

These facts are all very important and merit serious consideration, in connection, however, with my previous reports.

I encouraged the enterprising prospectors to persevere, and it is to be hoped that they will be able to continue their labor in boring to a greater depth, and ultimately see it crowned by a discovery which will be of the greatest importance to the country if a vein of petroleum be struck, as there is reason to expect will be the case.

The Mines North of Lake Superior.

There seems to be no doubt that Port Arthur is preparing for a mining boom on the opening of navigation. The reports coming from the working mines and recent discoveries in the new silver region, south and west of the township of Paipoonge, are certainly very encouraging. Several mines in that part of the country are in actual operation and producing some marvellously rich ore. Those adjacent to the township in the Rabbit mountain district have a large production considering the time they have been at work, and the difficulties they have had to contend with in the absence of a bridge across the Kaministiquia river and a proper wagon road. It is expected that these difficulties will be removed in the spring. If they are, the extensive working of the mines is assured, and access will also be given to a good agricultural and timber district as well. The Thunder Bay *Sentinel* points out that the construction of a proper wagon road and the Thunder Bay Colonization railway are much needed for the proper development of the country. The same newspaper in a recent issue refers to an examination which has just been made of the Silver mountain mine by three mining experts from Chicago. It is said that in the presence of these gentlemen a single blast put in a test pit upturned over \$6,000 worth of silver ore from less than a ton of the veinstone. Such ore is almost unprecedented and if the development continues as it has begun there is little doubt that the owners will receive the extraordinary prize of \$200,000 for which it is said the property has been bonded.

Log cabins are being erected on several localities in the neighborhood of these rich discoveries, teams are taking in supplies over the winter road before it becomes impossible, and preparations are being made for active development work in this region as soon as the snow goes off, on an extensive scale. The discoveries are not confined to any particular section of the new mining field, but they extend from the Kaministiquia and Slate rivers, where veins crossing them in the township of Paipoonge have been

found carrying silver, south to the international boundary and westward along it, a distance of over 40 miles. To the northwest of this silver region the gold formation adjoins that of the silver-bearing slates, and at various points valuable discoveries have been made.

Mines are at work on both sides of Pigeon river, the international boundary between the State of Minnesota and the Province of Ontario. On the Canadian side the Huronian Company has a very rich mine and a ten-stamp mill.

On this side of the boundary the gold is found in true fissure veins in the green slates of Huronian formation. The yield per ton is not claimed to be enormous but the gold is evenly disseminated in paying quantity throughout the veinstone and the veins are wide enough to admit of very large production. At the Huronian mine the vein measures from six to twelve feet wide and has been traced for a distance of half a mile on the company's property. Such properties are eminently suitable for companies with large capital.

In the silver district the Rabbit mountain, Twin City and Beaver mines have been worked all winter. The two former have made shipments of smelting ore and have a large amount of stamp rock on their dumps. The Twin City is ready to make another shipment of the same class of ore. Throughout this district the silver occurs in the black slates of Cambrian age.

Numerous discoveries of different kinds of minerals have been made on the north shore east of Port Arthur. Notably a zinc-blende deposit northeast of Neepigon bay, which will probably be worked extensively during the coming summer.

This whole mining country would be served with railway facilities by the construction of the Thunder Bay Colonization railway to connect with the Grand Maine and Vermillion Lake railway, and the Duluth and Iron Range railway, now in operation from the iron mines to the Lake Shore, and to be completed this year to Duluth, to connect there with the American system of railways.

The outlook of the mining industry in the district of Thunder Bay was never better than at present, and it should be encouraged in every legitimate way. Stock-gambling has now no foothold in the country, but practical men are becoming interested in the development of the mine. Let the work continue as it has begun and the value of this promising mining field will soon be established beyond any doubt.

CORRESPONDENCE.

PORT ARTHUR, Thunder Bay.
To the Editor CANADIAN MINING REVIEW,
Ottawa.

SIR,

I wish to correct a few statements which appeared about me in No. 1. Vol. 3., February, 1885, of your paper—for which, however, I suppose you are not responsible.

It is true that I examined and reported on the Beaver mine (in this district), but was not aware until to-day that this report had become public.

In the first place, the five samples of ore referred to by me were distinctly stated in my report not to represent the average of the vein, but to be average specimens of the different kinds of silver ore occurring in it. I presume that I could have secured specimens showing no silver, as I certainly could have secured specimens far richer than the richest that I assayed.

Next, the outcrop specimens assayed six dollars and sixty cents, which is slightly different from the \$660 that you have it.

Also, though \$995.75 certainly is the average of the results of these five assays, as I find on computation, still this fact was not mentioned by me—it is certainly misleading and has no value at all. Altogether, it seems to me to be an impossibility to obtain an average of a vein in five specimens.

Re the Rabbit Mountain mine, my report states that silver ore was showing in the drift and cross cut. I did not state that any of it was being extracted.

Yours, etc.,
W. H. FURLONGE.

March 23rd, 1885.

We regret that Mr. Furlonge should have been misrepresented in our notes on the Lake Superior mines, published in the last issue of REVIEW. These reports came to us, precisely as published, from an occasional correspondent of Port Arthur, and although we had misgivings as to the accuracy of the figures they contained, time did not admit of our waiting for their verification. We are indebted to Mr. Furlonge for his promptness in correcting these errors.—ED.

British Columbia Notes.

Mr. Baillie-Grohman has contributed an interesting paper to the *Canadian Gazette*, descriptive of the resources of Kootenay.

A petition addressed to the Lieutenant-Governor has been circulated in Barkerville for signatures praying that the geological surveyor employed in the province by the Dominion Government be requested to survey the district of Cariboo. There is a great deal of money and much energy expended annually in prospecting, and as very little is known regarding the extent of the gold-bearing belt, both money and energy are liable to be wasted in the absence of a geological survey.

The output of the several Nanaimo and Wellington Collieries for the year 1884 amounted to 395,900 tons, 87,388 tons of which was used in this province, and 308,512 was exported to the Pacific Coast States and Sandwich Islands and China. In 1883 the total output amounted to 216,184, and in 1882, the largest output of any year before 1884, it amounted to 282,000. In 1883 the home consumption was 64,786 tons, and in 1882, 56,161 tons as compared with 87,388 tons in 1884. The total output of 1884 is 179,184 in excess of 1883 and 113,900 tons in excess of 1882. To mine this 395,900 tons of coal it is estimated that 300,000 pounds of blasting powder was used. The material increase during 1884 was caused by the Vancouver Coal company energetically working their new mines on the Esplanade and at South Field. It is to be hoped that the year 1885 will show a material increase over 1884.

A meeting of miners was held in Victoria early in February with Mr. P. Smith chairman and Mr. R. Smith secretary. The following resolutions were adopted unanimously by the meeting: 1. That, owing to the insolvent conduct and threats of the Indians on Lorne creek last season, this meeting is of the opinion that the Government should take immediate action with regard to the protection of the life and property of miners situated in the aforesaid locality. 2. That this meeting deprecates the action of the Dominion Government in commuting the sentence of death passed on the murderer of Yoemans, as it will be the means

of inciting and encouraging the Indians to commit more murders and depredations. 3. That the protection of miners and their interests is urgently demanded, and if neglected by those who are in authority over them they alone must be responsible for the consequences of inaction and apparent partiality.

The mineral exhibits for the International and Colonial Exhibition at Antwerp, forwarded from the Province of British Columbia, are as follows:

Three blocks coal from Vancouver Coal Company mine, Nanaimo—4 cwt., 2 cwt., and 1 cwt.—to form a pyramid.

A block of Jarvis Inlet granite, Newcastle sandstone, and Beaver Cove Marble, to form another pyramid.

Specimen of Queen Charlotte anthracite.

Blocks of iron ore, magnetic and red hematite from Sooke.

Piece of Eureka mine silver ore from Hope.

Another piece from the Sterling mine, Cowichan.

Specimens of Jarvis Inlet copper.

Specimens of argentiferous galena from Kootenay.

Five specimens of Cariboo quartz from Burns' Mountain, supplied by Messrs. Oppenheimer Bros., of this city, and valued at \$250.

Petroleum in the North-West Territories.

The discovery of Petroleum in the Athabasca and Alberta districts is attracting a good deal of attention at the present time, and it is not unlikely that boring will be begun in the early spring. A strong company of capitalists of Minneapolis has been organized under the laws of the State of Minnesota, with a capital stock of \$1,500,000, to operate on the Lesser Slave and Red Deer rivers, where they have taken up extensive tracts of petroleum lands. This company, known as the Winnipeg and North-west Petroleum Company, have abiding faith in the value of the locations they have selected, and have given substantial evidence of it by shipping two car-loads of machinery, at a cost of over \$50,000, to Winnipeg to be forwarded to Sinclair on the line of the Canadian Pacific railway, and thence to their property on the Red Deer river, Alberta district.

It is stated that on this company's locations exist, probably, the most promising indications ever known where oil wells are not in actual operation. The crude petroleum exudes from the bank for a distance of half a mile and flows down the river, while similar indications are noticeable on the banks of the smaller streams, tributaries to the Lesser Slave and Red Deer, running through the companies locations. Petroleum gum and pools of oil on the surface of the ground occur in such quantity and of such a nature as to satisfy experts that extensive reservoirs of oil will be tapped by boring, and that flowing wells will unquestionably be struck. These locations have long been known by the North-west explorers as the "gum beds." The company is sanguine that oil will be obtained in paying quantities not far below the surface and at comparatively small expense.

Analyses of the gum taken from these petroleum fields have been made by Professor Chapman, of Toronto; Professor James A. Dodge, of the University of Minnesota; and by Ledoux and Richetts, of New York.

PROFESSOR CHAPMAN.

	Per cent.
Inflammable and volatile matter.....	94.53
Fixed carbon and ash.....	5.47
	100.00

PROFESSOR DODGE.

Volatile combustible matter.....	76.27
Coke.....	16.42
Ash.....	7.31

100.00

LEDoux AND RICHETTS.

Water.....	1.00
Oil.....	65.00
Coke.....	20.00
Light oil and Volatile matter.....	14.00

100.00

Professor Dodge gives the analysis of the oil as follows:—

	Per cent.
Water.....	54.8
Inflammable oil.....	26.2
Inflammable gasses.....	2.2
Non-volatile combustible matter.....	2.9
Incombustible matter, or ash.....	13.9

100.00

The developing of these oil fields will be watched with much interest, and if the expectations of the Winnipeg and North-west Petroleum Company are but partially realized this will become a most important industry in the North-west Territories. People having the enterprise to inaugurate an industry of such importance to the country should receive every encouragement at the hands of the Government, and it would not be more than should be reasonably expected if the machinery necessary to operate these oil fields were admitted into the country free of duty, or at least such of it as is not obtainable in Canada. In the case of the ranchers in the North-west they have been, and still are, permitted to bring their cattle in from the United States to stock their ranches, and if they are to be thus encouraged why should not the miners be dealt with as liberally, especially those who would develop such important deposits as those of coal and petroleum?

The Victoria (Australia) Gold Product.

As reported by a correspondent of the *London Mining Journal* of the 28th February, while the gold product of 1883 was 133,108 ounces less than 1882 that of 1884 was 33,957 ounces greater than 1883. According to the aforesaid correspondent, the product for the five years below was as follows:

	Ounces.	Our valuation.
1880.....	812,092	15,500,000
1881.....	886,416	16,840,000
1882.....	879,481	16,710,000
1883.....	740,378	14,067,000
1884.....	774,330	14,712,000

Total product 1880-84.....\$77,839,000
Yearly average.....\$15,567,800

That is, the product of 1883 was below the average of the period \$1,500,800 but that of 1884 was below the average but \$855,800. For the two years of 1883 and 1884 the gold exports and coinage of the colony were as understated:

	1883, ounces.	1884, ounces.
Minted.....	399,186	562,708
Exported.....	393,443	189,866
Exported coin.....	\$11,256,000	\$6,246,000

It may be safely estimated that the product of all the other gold fields of Australia did not exceed \$9,778,000 in 1884, and that the total gold product of all the Australian colonies did not exceed \$21,500,000.—*N. Y. Mining Record*.

The most disastrous colliery explosion of recent times occurred during the present month at the Camphansen pit, near Saarbrück, in Rhenish Prussia. Out of 218 men in the pit only seventeen escaped—the remaining 201 are supposed to have perished.

GOLD MINING IN CALIFORNIA.

We are indebted to Mr. W. Van Norden, President of the Plymouth Consolidated Gold Mining Company, for a copy of the annual report of the company's operations from the time of its organization up to the close of 1884. The report is convincing evidence of what can be done with a good property under careful and proper management. This company was organized June 1st, 1883, by the consolidation of the *Empire*, the *Amador Pacific* and the *Plymouth* companies, since which time the production of bullion, up to January 1st, 1885, amounted to \$1,714,008.65. The report shows that during the period mentioned (19 months) the operating expenses were \$541,158.75, and that \$148,554.85 had been distributed on construction account. Up to the close of 1884 dividends had been paid aggregating \$950,000, leaving cash on hand on January 1st, 1885, \$74,295.06. Since the report was published the company has paid \$150,000 in dividends, making a total of \$1,100,000 paid in dividends in somewhat less than two years.

The property of the company is located in the town of Plymouth, Amador county, California. The principal mine consists of an immense chimney of ribbon quartz from thirty to fifty feet wide and 315 to 450 feet long. The ore mills freely and contains one to two per cent. of sulphurets; the average yield of gold being thirteen dollars to the ton. There are two mills on the property, located about 1,000 feet apart, having an aggregate of 120 stamps, one with eighty and the other forty, the latter being the heavier, weighing 900 lbs. each. Both mills are crushing about 250 tons of rock daily; they were run with regularity during the past year and crushed in the aggregate about 80,000 tons of ore. Connected with the mills are forty Frue concentrators for saving sulphurets. The company has recently constructed chlorination works, and every department is conducted with economy and exactness, which accounts, in a great measure, for the marked success attending the operations at this mine.

A New and Remarkable Gold Deposit.

Through the courtesy of Mr. John Musson, of Sydney, New South Wales, we have received the report of Mr. R. L. Jack, of the Queensland Geological Survey, on the Mount Morgan gold deposit.

Mount Morgan is only twenty-two miles from Rockhampton, on the Fitzroy river, and not more than half that distance from the Central railroad. It is an isolated cone, rising from the plain through which runs the river Dee, the plain being flanked east and west by bluffs of Mesozoic sandstone, out of which the valley has evidently been carved down to the level of the primitive stratified rocks that now form its floor. These old shales and quartzites are riven by dikes of rhyolite; and through them have evidently come to the surface geyser springs, the deposit from which has formed the cone of Mount Morgan. The water has, besides gold, carried in solution silica, iron, alumina, etc. But the gold seems to have been precipitated chiefly in the cup of the geyser, and to be richest in a large mass of iron ore, which, in the form of an inverted cone, forms the vertical axis of the mountain, and in the nodules of iron ore that occur in certain soft cellular siliceous layers. These alternate with more or less ferruginous layers, all of which radiate, like the leaves of a fan, from the base of the cone, and inclose the iron ore. Gold occurs in all the layers, except

in a siliceous earth, and therefore its association with iron is certainly not accidental.

Mining is conducted by quarrying down the apex of the cone, and from an open cut 100 feet below the summit. The yield of the rock is almost fabulous. Working returns are not given; but fair samples selected by Mr. Jack gave from a quarter of an ounce to 10 ounces per ton, and others sent to the Sydney mint to be experimented on gave 85 ounces per ton. Some of the rock in these samples was selected.

Prolonged amalgamation extracts only about half the gold; but during the few months the mine was worked, prior to the publication of the memoir, the Sydney mint had received 10,000 ounces. It differed from any other gold known to commerce in that it was unalloyed with silver, assaying 99.7 per cent. of pure gold, the 0.3 per cent. being copper and iron.

A few more such mines would relieve the financial world of the apprehension it seems to be labouring under of a scarcity of gold.

It is worthy of note that the report was mailed in Sydney on January 28th, and received here on February 28th.

As might be expected, the wildest estimates of the value of this gold deposit or hill are circulating. One that we have seen gives it at about \$135,000,000.—*Engineering and Mining Journal*, N. Y.

GOLD NOTES.

The gold product of the Province of Nova Scotia from 1862 to the close of 1884 has aggregated 366,995 ounces.

The value of the gold production of the Province of British Columbia from 1858 up to the close of 1884 amounts to \$48,626,963.

Since the discovery of gold in California in 1848 up to the present time the production of that State and of Australia has been as follows: California, 1848-1884, 37 years..... \$1,200,000,000
Australia, 1851-1884, 34 years..... 1,350,000,000

In February, 1851, gold was discovered on the Macquarie River, New South Wales. This led to the working of the vast gold fields of Australia. The maximum was reached in 1852 when the Australian placers yielded \$102,000,000.

In sinking an artesian well at Savannah, clay was struck at a depth of 140 feet that yielded a large percentage of gold. Fine specimens of crystal quartz are brought up daily. A large lump of ore was found about the size of a hens' egg and containing fully 75 per cent. of silver.

Estimated stock of gold coin in the world at the time of the discovery of America in the year 1492..... \$ 140,000,000
Gold production of the world, 1493 to 1600 520,000,000
" " " 1601 to 1700 628,600,000
" " " 1701 to 1800 1,308,800,000
" " " 1801 to 1850 816,200,000
" " " 1851 to 1883 4,158,330,000
Total since discovery of America..... \$7,571,930,000
Estimated stock of gold in the world at the present time..... \$3,750,000,000

The El Callao Mine, of Venezuela, during 1884, shipped gold bullion to Barring Bros & Co., London, to the value of \$3,475,000, out of which the share-owners received in dividends \$56 per share of their holdings, aggregating \$1,800,000. In January, 1885, this famous mine produced 8,532½ ounces of gold and paid

a dividend of \$3.33½ per share, aggregating \$107,333. In January, 1884, 12,941 ounces of gold were shipped from this mine valued at \$233,000.

On the 19th of January, 1848, James W. Marshall, while engaged in digging a race for Sutter's sawmill, at Colonia, on the American fork of the Sacramento River, found some pieces of yellow metal which he supposed to be gold. This was the first installment of over twelve hundred millions of dollars which the placers and quartz mines of California have yielded to the world. The production reached its maximum in 1853, when \$65,000,000 was produced from placer mining.

Miscellaneous Notes.

Utah's mineral product in 1884 was \$7,389,836.

The State of Nevada produced \$7,000,000 of gold and silver in 1884.

The Russian platinum mines are said to be the most valuable mines in the world.

The Comstock mines, of Nevada, produced \$180,000,000 of silver and \$145,000,000 of gold in 20 years.

It is estimated that the gold product of Queensland during the past ten years has reached \$75,000,000.

The estimated amount of anthracite coal remaining in the fields of Pennsylvania is 23,300,000,000 tons.

For the fiscal year ending June 30, 1884, the export of precious metals from Mexico amounted to \$33,473,283 in value.

The official return of the exportation of rough and uncut diamonds exported from the Kimberly division of the Cape of Good Hope during November, 1884, states that their weight in carats was 212,098½, and their declared value £246,845.

ASSESSMENT DIRECTORY.

(N. Y. Mining Record.)

This table is prepared from the official advertisements published by the organ of the San Francisco Stock Exchange.

[Stocks are sold in New York with assessments paid fifteen days anterior to the date of delinquency at office of the Company, as given in the table below.]

COMPANY.	When levied.	Delin- qu't in Board.	De lin- qu't in office.	Day of Sale.	Am't.
Excelsior W. & M.	7 Sept	2	Mar 11	Mar 3	50
Bulwer Con.	1 Jan 13	Feb 13	Feb 24	Mar 31	20
Independence.	14 Jan	21 Feb	21 Mar	2 Mar 31	15
Caledonia B.H.	15 Jan	27 Feb	27 Mar	9 Ap'l	6 15
Champion.	18 Jan	28	Mar 6	Mar 26	10
Bute Creek Hyd.	11 Jan	30	Mar 9	Mar 3	10
Savage.	62 Feb	2 Mar	5 Mar	6 Mar 26	50
Bodie Tunnel.	10 Feb	2 Mar	5 Mar	7 Mar 28	20
Llewellyn Steam Co.	3 Feb	4	Mar 9	Mar 2	51
Homeward Bound.	3 Feb	5	Mar 12	Ap'l 6	15
Golconda.	1 Feb	7	Mar 12	Mar 3	03
Belmont.	30 Feb	11 Mar	4 Mar	21 Ap'l	3 15
Union Con.	20 Feb	6 Mar	9 Mar	24 Ap'l	25
Ophir.	49 Feb	18 Mar	21 Mar	24 Ap'l	1 10
Sierra Nevada.	8 Feb	18 Mar	20 Mar	25 Ap'l	4 25
Cal. Paper Co.	1 Feb	19	Mar 24	Ap'l 10	5 00
Golden Channel.	2 Feb	22	Mar 26	Ap'l 2	21
Mexican.	29 Feb	24 Mar	27 Mar	31 Ap'l	2 05
Andes.	26 Mar	2 Ap'l	8 Ap'l	8 Ap'l	25
Hale & Norcross.	84 Mar	2 Ap'l	2 Ap'l	7 Ap'l	28 50
North Star.	Mar 5	5	Ap'l 9	May 1	1 50
The Tower Con.	2 Mar	11	Ap'l 15	May 5	10
Alaska.	1 Feb	25	Ap'l 18	May 16	03
Sulphur.	3 Feb	25	Ap'l 16	June 1	50

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Inverness, Megantic, P.Q.

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Mining Rights on S $\frac{1}{2}$ of Lot No. 16, in the 1st Range.
" " on Lot No. 23, in the 2nd Range.
" " " No. 26, in the 4th Range.
" " " No. 20, in the 5th Range.

The fee simple of Lots Nos. 22 and 23, in the 4th range, (400 acres). All these lots have been carefully explored by experts and very favourably reported on; they are virgin properties and in the heart of the Phosphate Belt. For further particulars and price apply at the office of the MINING REVIEW.

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In the Township of Portland West,

FOR SALE.

Lots 25, 26, 27 and 28, in the 3rd range. Some excellent surface shows have been uncovered on these lots and only require capital for developing. Price and particulars given at the office of the MINING REVIEW.

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50 Good Miners Wanted. 50

Wages, \$1.25 per day; regular board, \$3.00 per week.

For further particulars apply to

A. H. DeCAMP,
Supt. Oxford Gold Mines,
Musquodoboit Harbor,
NOVA SCOTIA.

WANTED.

FIFTY EXPERIENCED MINERS.
Wages, \$1.25 to \$1.35 per day; board, 3.00 per week.

For further particulars apply to

M. R. DISOSWAY,
Supt. Essex Gold Mining Company,
TANGIER,
NOVA SCOTIA.

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DEVELOPED
PHOSPHATE MINE**

ADJOINING THE FAMOUS LITTLE RAPIDS MINE IN PORTLAND EAST.

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VOL. 3.—No. 3

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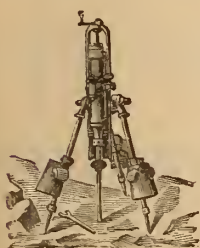
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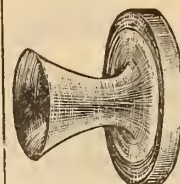
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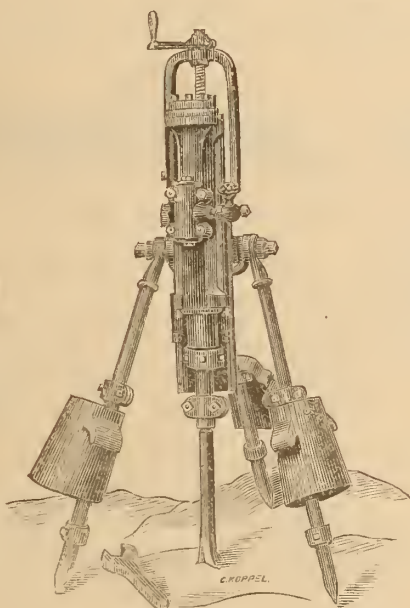
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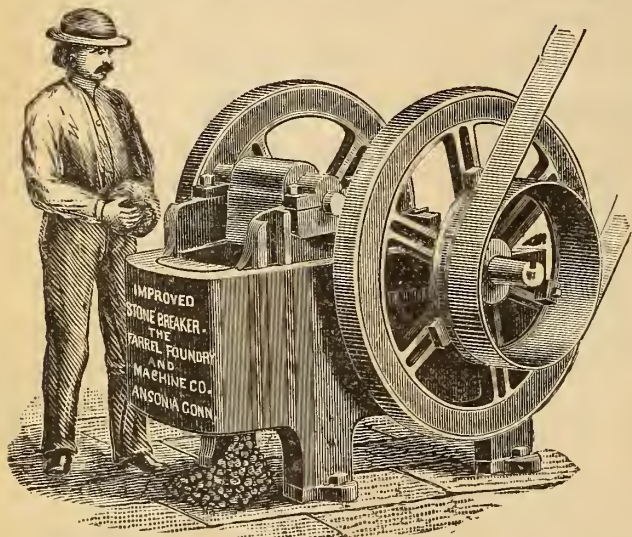
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The principal shareholders now residing abroad, is the reason for wishing to realize and close up the business of the company.

To parties purchasing the whole of the company's interest, their Letters Patent would be transferred, thus enabling the purchasers to carry on the business as a company without loss of time or further expense.

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**MAIL CONTRACT.**

SEALED TENDERS addressed to the Postmaster-General, will be received at Ottawa, until noon, on Friday, 15th May, 1885, for the conveyance of Her Majesty's Mails, on a proposed contract for four years, six times per week each way, between

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—AND—

OTTAWA,

from the 1st July next.

The conveyance to be made on foot or otherwise.

The Mails to leave Ottawa daily (Sunday excepted) at 10.15 a.m., and arrive at Billings' Bridge at 11 a.m.

TO LEAVE BILLINGS' BRIDGE AT 1.05 P.M., AND ARRIVE AT OTTAWA AT 1.50 P.M.

Should the tender of any one residing at Billings' Bridge be accepted the point of departure will be changed accordingly.

Printed notices containing further information as to conditions of proposed contract may be seen, and blank forms of tender may be obtained at the Post Offices of Billings' Bridge and Ottawa, and at this office.

T. P. FRENCH,

Post Office Inspector's Office,
Ottawa, 15th April, 1885.

**GRAVING DOCK.****BRITISH COLUMBIA.**

SEALED TENDERS, addressed to the undersigned, and endorsed "Tender for Caisson, Graving Dock, B.C.," will be received at this office until Monday, the first day of June, 1885, inclusively, for the construction, erection and placing in position of a

CAISSON FOR THE GRAVING DOCK

—AT—

ESQUIMALT, B.C.,

According to plans and specification to be seen at the Department of Public Works, and on application to the Hon. J. W. Trutch, Victoria, B.C.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, the blanks properly filled in, and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque for the sum of \$2,000, made payable to the order of the Honorable the Minister of Public Works, which will be forfeited if the party decline to enter into a contract when called on to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

By order,

A. GOBEIL, Secretary.

Department of Public Works, }
Ottawa, 23rd March, 1885.

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The CANADIAN MINING REVIEW is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts as well as others interested in Canadian Mineral Lands are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 20th of the month.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

It is gratifying to know that the mineral resources of Canada are receiving more attention than formerly and that the inactivity of the past in the mining districts of the Dominion is giving way to active mining operations. Capital is rapidly finding its way here for investment and through its agency our mines are being profitably developed. In the gold districts of Nova Scotia, where desultory mining has been carried on for many years, the investment of foreign capital has brought about a marked change in results. By the introduction of modern machinery at the gold mines, and by employing skilled labour, under practical and economic management, many properties in the province that had been abandoned are now made to yield gold in paying quantity and at large profit. The Nova Scotia coal mines are being more extensively worked than ever before, and in New Brunswick valuable manganese mines, and other mineral deposits, are being developed. The gold mines of Beauce, in the Province of Quebec, are being worked to advantage and some of them promise to become sources of great wealth to their owners, who are conducting operations with system and economy, with a view to permanent working. The asbestos mines of the Eastern Townships have been yielding abundantly for the past two years, and operations are now about to be resumed here, having been suspended during the winter months. The silver-bearing quartz ridges in the County of Beauce are being thoroughly prospected and with encourag-

ing results. Some of the copper mines in the Eastern Townships, notably the Capelton mines, are being extensively worked and are returning large profits to the owners who are engaged in the manufacture of sulphuric acid, to which the ore, pyrites, is eminently suited. In the County of Ottawa the phosphate mines are more productive than ever before, and the ore is being raised and carried to shipping point at greatly reduced cost, owing to the introduction of steam power and the increased facilities afforded for transportation. Mica is also being mined in the Ottawa district in large quantity and in quality equal to that produced in any other part of the world. In Pontiac County the Bristol iron mine is developing beyond the most sanguine expectations and promises to become a very important producer of an excellent quality of magnetic iron ore. Some of the iron mines of Central Ontario are also being extensively worked by a powerful organization of American capitalists, and further westward, in the Lake Superior and Lake of the Woods districts, the gold and silver deposits are being carefully developed, and the recent important discoveries in the Thunder Bay district have created quite a stir among mining men, and foreign capital is being liberally invested there. The coal mines in the Northwest Territories are being profitably worked, and one very important deposit of *anthracite* is about to be developed. From the Rocky Mountains westward, and to the southwest, in British Columbia, valuable discoveries of economic minerals are being daily reported, and the prospects for successful mining in that province during the present year are very bright. The success which is now attending operations at the gold mines in Nova Scotia, in Beauce, in the Thunder Bay district and at the Lake of the Woods is considered by mining men to be of great importance, as it is evident from the course of events that more attention will be given in the future to the development of gold properties. The *Engineering and Mining Journal*, N.Y., in a recent number says:

"Gold mining is attracting more and more attention everywhere throughout the civilized world. The production of gold is decreasing and the amount required is constantly increasing. The consequence is, that the purchasing power of gold is greater every year. Gold mining is almost the only industry whose product is more valuable the "harder" the times and the less it costs to produce. It is almost the only mineral product that never depreciates in value and that never overstocks the market."

Therefore, we add, develop your gold claims!

The Hon. John Norquay and others, of Winnipeg, give notice of application for incorporation as the Otter Tail Gold and Silver Mining Co., of Winnipeg; capital \$250,000.

Mr. J. Obalski, Government Mining Engineer for the Province of Quebec, and Professor at the Polytechnic School, will move his office on the 1st May from Quebec to the Government buildings on St. Gabriel Street in Montreal.

Canada's Phosphate Industry.

The phosphate mines in Ottawa county are attracting more attention at the present time than at any former period since they have been in operation. The many improvements that have been made at the mines by the introduction of steam drills and hoists and other machinery have so facilitated the raising of ore that owners of mines have been enabled to largely increase their output, and additional facilities for transportation having been provided during the past year, the difficulty of carrying the ore to the point of shipment, at Montreal, has thus been removed and the cost of transportation greatly reduced. There is no longer any necessity for winter delivery at Buckingham. Mr. Lomer, of Montreal, with his usual foresight and enterprise, now has a suitable steam-tug and sufficient scows ready for transporting ore when navigation opens in the Riviere du Lievre. There are other ore vessels on the river which, together with those owned by Mr. Lomer, will supply sufficient transport accommodation to deliver the entire output of the mines in the district at the railway terminus during the summer months. The branch line of the Canadian Pacific Railway from the landing to Buckingham station in the main line will be in running order before the shipping season from Montreal will have begun. The road-bed was graded last autumn and the rails have been laid over more than half the distance (two miles) since the snow disappeared. With the accommodation afforded by this branch line the phosphate shippers have been relieved of the annoyance, responsibility and expense of carrying their ore for three and a half miles over a road that has been almost impassable at all seasons, and quite so during the spring and autumn months. The ore that has been raised during the past six or seven months has accumulated and now presents an imposing sight. An inspection of the piles at the various mines cannot fail to convince buyers that the output to go forward this season is of a higher grade than that of former years, which is strong evidence that miners are giving more attention to the careful clobbering and cleaning of the ore so as to bring it up to a high state of purity. The condition of the foreign fertilizer markets is not yet as encouraging as might have been expected and but limited sales have been made at present ruling prices. From the prices of two years ago there has been a downward movement, but notwithstanding the present comparatively low quotations the margin of

profit to producers is upwards of one hundred per cent. Since the breaking up of winter roads the mines have been difficult of access and this will be the case until the ice leaves the river and navigation has opened, which is looked for any day. The past winter has been a very severe one, the most severe in fact in the recollection of old settlers, and yet mining operations have been in no wise checked thereby. Upwards of 18,000 tons of phosphate have already been raised since the close of navigation last year and the mines are in such condition now as to render them capable of yielding sufficient ore during the next four months to bring up the total year's output to the figures approximately estimated in our last issue.

The Phosphate of Lime Company, the Union Phosphate Company, the Dominion Phosphate Company, the Ottawa Phosphate Company, the duLievre River Phosphate Company, W. A. Allan, and Messrs. McLaurin and Blackburn are all turning out ore in large quantity, and their mines continue to improve with development. More attention is now given to deep mining and those who have so directed their operations, notably the Dominion Phosphate Company and Mr. W. A. Allan, have been much encouraged. The phosphate industry of the district was never more promising than now.

Phosphate Quotations.

The most recent quotations received from abroad for Canadian phosphate are 1s. 1d. for 75 per cent. guaranteed, straight, and 1s. 1½d. for 80 per cent. with one-fifth of a penny rise. Some contracts have been made at these figures with stipulations by sellers for Canadian analysis. In these cases assayers in Montreal, Toronto and New York have been selected.

Transportation of Phosphate.

The cost of transporting phosphate from the mines to Montreal has been reduced to a minimum. The scale of charges from High Falls to Buckingham landing by scow, after opening of navigation, will be from 60c. to 35c. per ton, according to location of mine. From Buckingham landing to Montreal per C. P. R. the rate has been made at \$1.40 per ton—a saving of quite \$1.25 per ton on former cost from the mines. Ocean freight rates will be uncertain until after the opening of navigation, but it is not expected that they will rise much higher than last year. If war should be declared between England and Russia ocean freights would probably be affected, and insurance will certainly be higher.

In Dr. Selwyn's last "Report of Progress" of the Geological Survey of Canada appears a report by Mr. J. Fraser Torrance on the apatite deposits of Ottawa County. After describing many of the most important mines, and referring to statistics of the trade, prices, &c., Mr. Torrance adds: "The question of appointing official inspectors and analysts to certify to the quantity and grade of every shipment from Montreal has often been agitated. The shippers are at present compelled to accept the certificates of the analysts employed by the purchasers as the basis of settlement. I hesitate to recommend any official action by the government in

this matter." This is a question of sufficient importance to call for the co-operation of phosphate shippers to effect a new and more equitable system of purchase and sale.

South Carolina Fertilizers.

STATEMENT OF THE SHIPMENT OF FERTILIZERS FROM CHARLESTON, S.C., DURING THE FIRST THREE MONTHS OF THIS YEAR, AS COMPARED WITH THE SHIPMENTS DURING THE SAME PERIOD OF 1884.

Major E. Willis, Charleston, S.C., has furnished us with the following statement, showing the shipment of fertilizers from Charleston during the months of January, February and March in 1884 and 1885. The statement shows that the shipments during the present year have been 11,952 tons in excess of the shipments made during the first three months of last year:—

	1884.	1885.
January—By the		
South Carolina Railway.....	21,443	23,297
Northeastern railway.....	5,194	7,070
Charleston and Savannah railway..	4,196	3,435
Pee-Dee and Santee steamer.....	2,009	2,196
February.		
South Carolina railway.....	29,171	27,175
Northeastern railroad.....	12,318	11,398
Charleston and Savannah railway..	5,373	4,457
Santee and Pee-Dee steamers.....	1,900	2,354
March.		
South Carolina railway.....	18,118	26,846
Northeastern railroad.....	7,822	10,571
Charleston and Savannah railway..	3,525	2,466
Santee and Pee-Dee steamers.....	2,311	2,043
By other routes to Wilmington and Washington, N. C., Richmond, New Orleans and New York, January, February and March.....	2,360	4,384
	115,740	127,692
January.....	33,202	36,598
February.....	49,762	47,384
March.....	32,776	43,710
Total shipments.....	115,740	127,692

NOTES ON PROFESSOR BOYD DAWKINS' PAPER, "APATITE DEPOSITS NEAR OTTAWA."

(Published in March number of Canadian Mining Review)

BY

MR. GERRALD H. KINAHAN.

Read before the Manchester Geological Society, February, 3rd, 1885.

I have read with considerable interest Professor Dawkins' valuable paper on the occurrence of the phosphate, but his remarks as to the origin of the deposits at the Emerald mine are, it appears, not quite conclusive. The precise origin of these deposits is difficult to conceive; they are not sufficiently regular in structure or direction for lode, or fissure deposits, nor are they continuous enough for bedded masses, unless it be that the original bed—of limestone say—became greatly contorted and broken up, or possibly pinched through in places, on the plication of the strata while undergoing intense metamorphism.

From a cursory examination of the deposit at the Emerald mine in the fall of 1883, it appeared to me that the phosphate occurred in a partially altered limestone bed; the alteration having been most complete on the upper side, but had gradually invaded its lower portion; athwart this bed there were apparently smaller veins of segregative or secondary origin.

The main bed had then essentially the same structure as described in the paper, except that the apatite crystals were more numerous towards the junction of the calcite and the massive

deposits of apatite. The bed dipped south at about 75°; on the south or hanging wall the apatite was massed; to the north lay the calcite or crystalline limestone; but about two feet beyond or under what appeared to be the foot-wall or base of the bed, phosphate was reported to occur again; this had not been opened upon.

The apatite crystals penetrating the limestone were very perfect; many doubly terminated, and some very massive; they appeared to have been introduced, or to have grown subsequently into the calcite, similar to the growth of magnetite crystals, or iron-pyrites crystals in fine slates and shales. Many of them contain enclosures of calcite, which are always more or less spherical, as though squeezed by the growth of the enclosing crystal. Almost perfect, large crystals of pyroxene also occurred in the calcite; one specimen measured 4 in. by 1½ in. by ¾ in. The bed appeared to be much wider in depth than at its outcrop, where apparently weathering had allowed the country rock to close in over it.

In a deep and wide cut run in from the west, to open up the deposit, a vein, about two feet wide, and dipping north (across the bed) at about 60°, showed in the face of the working; it had a "lody" structure, and contained specimens of galena, zinc-blende, copper and iron-pyrites. In the centre there was a rib of selenite two inches wide; on the upper side of this vein, phosphate was more plentiful than above.

It is difficult to correlate the phenomena at the Emerald mine with either ordinary segregation veins or true lode deposits. In segregation veins the filling materials are chiefly the constituents of the adjoining rocks, and largely crystallized. In this deposit the mica is almost the only mineral that can be said so to occur. From a deposit in a true fissure vein, that of the Emerald mine differs both in composition and structure.

The contents of the vein—exclusive of the apatite and calcite—both in quantity and variety of minerals, are comparatively limited; and except in the case of the metallic sulphides, are not those of true lodes. Quartz in particular is notably absent. Specimens do occur, but they are not abundant. The dearth of fluoride is remarkable; it occurs most intimately intermingled with the phosphate; but as a separate species it is not plentiful. The occurrences of calcite in these rocks in such quantities as a gangue is exceptional. Calcite as a gangue in fissure veins mostly accompanies lead ores, especially in limestone rocks. It does occur in fissure veins in other rocks—as granite—but is generally subordinate to the barytes, quartz, or spar gangue.

In structure the deposit does not resemble that of a true lode or fissure vein. There is an absence of continuity in any particular direction, and in cross section there is no correspondence between deposits on opposite sides, calcite occurs on the foot, apatite on the hanging wall. If these deposits occurred simultaneously, what could produce this separation? If at separate times, the first to deposit should occur on both walls.

On account of the absence of the more common phenomena of mineral veins, it appeared to me that this deposit had resulted from the action of a solution bearing fluorine and phosphorus (in what combinations it is impossible to say) on a bed of limestone, and that the "lody vein" previously mentioned was the channel through which this solution had access; and that the transverse veins were small fissures in which this solution re-acted upon a calcareous one. This latter phase (the transverse veins)

more marked at the Victoria mine (Gore); but there much of the phosphate appeared to occur in a large pegmatite dyke. The same is, I believe, the case at the High Rock mine.

In our next issue will appear a paper "On a possible Genesis of the Canadian Apatite," by G. Henry Kinahan, M.R.I.A., &c., which was read before the Geological Society of Manchester, February 3rd, 1885.

MINING IN NOVA SCOTIA.

GOLD.

By the last annual report of the Department of Mines of Nova Scotia it is shown that gold mining in the province, during 1884, was profitably carried on, and that the production for the year, though not large, exceeded that of 1883 by 633 ounces. The returns show that 118,087 days' labour were performed during the past year; that 25,147 tons of quartz were extracted and crushed, yielding 16,079 oz., 14 dwts., 10 grs. of gold—an average of 12 grs., 18 dwts., per ton—and that the average earnings per man, per day, were \$2.40.

The following mines worked steadily during the year: the Gallagher, Darr's Hill, Brunswick, Oxford and Empress, and have made satisfactory returns. Other mines were getting under way, with good promise of steady operations during 1885, among which may be mentioned the Bluenose, Montagu, Leipsigate, Rawdon and Fifteen Mile Stream mines.

Throughout the gold districts several large lots of low grade ore have been profitably mined; notably, 9,799 tons at Salmon River, yielding at the rate of 6 dwts., 20 grs., and 1,679 tons at Renfrew, yielding at the rate of 6 dwts., 18 grs., per ton.

The richest yield the returns show is 2,212 oz., 8 dwts., from 913 tons of quartz crushed by Gallagher Gold Mining Company, being an average of 2 oz., 8 dwts., 10 grs. to the ton.

In the Leipsigate Lake district the operations of Messrs. Hall and Owen show a return of 130 tons crushed last fall, yielding 410 ounces—fifty tons of which gave 250 ounces. It is to be hoped that this promising district will rank, this year, among the best of the provincial mines. A crusher of ten stamps, driven by steam, has been built near the cross-head.

In the Chezetcook district operations have been principally confined to the property of the Oxford Gold Mining Company. The returns of the Department of Mines show that 2,464 tons of quartz were crushed during the past year, and yielded 1,887 oz., 18 dwts., making the total returns 5,479 oz. from 4,550 tons of quartz. Mining has been carried on in the *Mill* and *Coleman* lodes to a depth of about 100 feet. Hoisting power, etc., is carried to the shafts by wire rope from the mill-house, where additional engine power has been put up. The surface arrangements have been improved, and additional accommodation provided for those engaged about the works. The property has now one of the best mining plants in the province, and its history has hitherto been a very successful record.

Mr. M. F. Hunt, President of the Oxford Gold Mining Company, in his annual report for 1884, which is now before us, addressed to the shareholders, shows that during the year 2,577 tons of quartz from the *Mill* and *Coleman* lodes, were crushed, and that the average yield per ton was \$16.84; and that the total number of tons crushed since the mill started amounted to 4,754 up to December 31st, 1884, yielding an

average of \$22.79 per ton. Also, that No. 4 shaft of the *Mill* lode was down 148 feet at the close of the year. These figures are somewhat at variance with those reported by the Department of Mines.

It is to be regretted that no regular work has yet been started on the other auriferous lodes of this district, as it promises to be one of the best in the province.

COPPER.

During last summer some prospecting was done on a copper vein at Scott's Hill, Pictou County. A little work was done at the Margaretville copper mine, Annapolis County. Here native copper and carbonate is found in the joints of the trappean ash, and the indications would appear to warrant further development. A few tons of copper is reported to have been extracted from one of the Pugwash deposits of grey copper ore. In this connection the development being made at Dorchester, in New Brunswick, lead to a hope that some of these upper carboniferous deposits may have value in Nova Scotia.

Near Antigonish a deposit of copper ore was said to have been found last fall. Some work was done near Whyhogomah on a vein of copper pyrites, in a diorite band.

In the Ohio district an opening was made on a deposit of yellow and grey copper ore, yielding 1,120 lbs. of copper, $6\frac{2}{3}$ dwts. of gold, and 3 oz. of silver to the ton.

At Coxheath, during the past year, about 275 feet of drifting were made to the north and south in the 190-foot level. During the progress of this work about 100 tons of 8 per cent. ore were taken out. In addition to proving the continuity of the vein of ore found in the 140-foot level, two new and promising veins were cut, which yielded about 10 tons of 10 per cent. ore from the exploratory drifts. One of the veins yielded some 30 per cent. ore. The result of the exploratory work carried on has been to expose about 1,000 tons of ore between the 140-foot and the 190-foot levels, running from 5 to 10 per cent. of copper, with good promise of continuity in depth.

The following estimate of Mr. Van Slooten, Superintendent of the Coxheath mine, would show that copper matte can be produced at Sydney under very favourable circumstances.

Assuming that 7 tons of 5 per cent. ore will make one ton of 32 per cent matte, and a daily output of 50 tons:

Mining, dead work and transport to tide-water of one ton of ore.....	\$2 50
Coke, $\frac{1}{3}$ of a ton, \$1.50.....	25
Iron ore, $\frac{1}{3}$ of a ton, \$2.00.....	67
Labor.....	25
Superintendence, oil, coal, &c.....	25
Freight to Swansea, $\frac{1}{3}$ of a ton of matte, @ \$5.....	72
Port charges and storage, $\frac{1}{3}$ of \$1.75.....	25
Commissions, assays, &c.....	72
Total.....	\$5 61

which would leave a good margin even at the present low prices of copper.

IRON.

During last year the Steel Company of Canada continued working the East and West mines at Londonderry. Before the close of the year preparations were being made for sinking below No. 7 level, and it was planned to use an underground engine for raising ore from the deeper workings. The company finding that they had large quantities of "Spathic ore" available, in addition to the limonite, which has hitherto been exclusively smelted, are now using it in their furnaces.

This mineral, also known as Sideroplesite (classed by Dana as a variety of ankerite) is found in few places in quantities making it

valuable to the iron smelters. In general terms it may be described as ankerite with its calcic carbonate replaced by ferrous carbonate. Mr. Henry Louis, late analyst to the Steel Company of Canada, gives the following analysis of it, which shows that it is an important source of iron:

Insoluble silicious matter.....	47
Calcic carbonate.....	59
Ferrous ".....	69.20
Manganous ".....	1.37
Magnesian ".....	28.73
Ferrie oxide.....	.08
	100.44

At first this ore was found in the West mines mixed in strings and veinlets in ankerite; as the workings were deepened it became freer from ankerite, which at many points is present in very small amounts. The extensive deposits of this ore in the mine warrant the expectation that it will prove of much future economic value. Kilns have been erected for calcining it before it is introduced into the furnace.

The returns of the mine show that 54,885 tons of iron ore, and 5,799 tons of ankerite were extracted during 1884.

On the East River, and at other points in Pictou county some explorations were made, and the Inspector of Mines for the province remarks that it is greatly to be regretted that no successful attempts have been made to utilize the large and varied iron ore deposits of this county.

Discoveries of iron ore during last year were reported from Lorne, Pictou County; Whyhogomah, Inverness County; and Malvern, Annapolis County. Near Digby some prospecting was done in small veins of Magnetite in the Triassic Trap near its junction with the underlying substance. Analysis of the ore is said to show:

Iron.....	60.430
Silica.....	14.320
Phosphorus.....	.036
Sulphur.....	.046
Titanic acid.....	none

ANTIMONY.

During the past year a valuable mine of antimony ore has been opened out at Rawdon, Hants County. Two shafts, 120 feet apart, have been sunk about 175 feet, and levels driven, from which 600 tons of No. 1 ore have been raised. The vein, which is of grey antimony ore, is from 4 to 18 inches in width, cutting talcose slates. There is little impurity present beyond small amounts of quartz and calcspar. An analysis by Mr. H. M. Smith, made in Dr. Lawson's laboratory, Dalhousie College, showed the ore to be of almost chemical purity, having little beyond mere traces of foreign material.

This discovery has led to prospecting for other deposits of the ore, and it is probable that a large district here will be found to yield it. Similar ores have been reported from Upper Stewiacke.

Though new in Nova Scotia it is not unlikely that this ore will prove a source of profitable mining and smelting.

GYPSUM.

The total exports for 1884 amounted to 11,068 tons, against 144,688 tons during the preceding year. It is anticipated, however, that the exports during the present year will resume their normal volume.

At Windsor operations are carried on almost exclusively by Mr. Edward Dimock, who has combined the various quarries on the St. Croix River. During the past year he replaced a horse tramway from the quarries to the river

by a railway of standard gauge, equipped with a locomotive and a set of self-tipping 5-ton cars. The openings into the various quarry faces will allow readily of a daily shipment of 500 tons of gypsum. The amount shipped from Windsor during 1883 was 80,072 tons. The quality of much of the rock was very good.

The New York Plaster Company re-opened the old quarry at Grandique Ferry, Richmond County (said to have been worked by the French during the occupation of Louisburg), and built a wharf. It is expected that a considerable trade will be done by this company during the present year.

MANGANESE.

The total production of manganese ore during 1884 was 302 tons. Mr. J. W. Stephens continued working his mine at Tenny Cape, and small lots were mined at Cheverie.

At the East Mountain, near Truro, Messrs. Stevens and Carter took out about 30 tons of very good pyrolusite from the drift, and have, it is reported, found the vein which they consider to have yielded the drift ore.

At Loch Lomond, in Cape Breton, Mr. E. T. Moseley continued working the Moseley manganese mines, and states that he is prepared to supply high grade ore, guaranteed 90 per cent. of binoxide. He has put in machinery for hoisting and pumping, and has done preliminary work.

LEAD.

One hundred tons of ore, averaging about 40 per cent. of lead, were taken out last fall at Smithfield, and a small smelter was erected. The ore was burned in heaps, and it was found that calcination was not carried far enough. Calciners were then put up, and after proper roasting the ore was found to be self-fluxing. The inception of this undertaking is extremely interesting, as the establishing of lead smelting will mark a new departure in the mining industries of the province.

Mica in Canada.

In all directions in Canada where mining or quarrying is carried on, abundance of mica is to be met with, but in most instances it is unmarketable. In the majority of cases it is associated with a limestone formation, and this is pronounced of no commercial value. In some localities, however, as in the Ottawa valley, it occurs in regular veins lying between well-defined walls of feldspar and quartz, and in others the veins are hemmed in by granite. The mica found in these formations is of a very superior quality and, in clearness and the size of the sheets, it is equal to that imported from North Carolina and New Hampshire. On the north shore of Lake Superior and in the Lake of the Woods district some excellent mica has been discovered, but the only mines of importance that are being worked in Canada at the present time are the *Pike Lake* mine, in Burgess, and the *Villeneuve* mine, Ottawa County. From both of these mines regular shipments of excellent mica are being made, amounting to several hundred pounds monthly. At *Pike Lake* mine one shaft, now at a depth of 60 feet, is yielding abundantly, and the crystals are all unusually large, many of them being capable of yielding plates measuring 8 x 12 inches. The *Villeneuve* mine, which has been greatly improved by development, has been yielding abundance of large size mica of a quality equal to any that has been imported into Canada. A drift has been run into the face of the hill which has cut the lead at a depth of 40 to 50 feet

from the surface, exposing a great number of well-formed and large crystals, proving the continuity of the lead and that the mica improves as it becomes protected from atmospheric influence. The crystals of mica are here associated with tourmaline crystals in a gangue of feldspar and quartz.

Another mine is being worked in Loughborough, county of Addington, which produces a good quality of dark amber mica, and operations have been conducted successfully during the past year or longer.

Two promising deposits of excellent mica occur in the township of Miller, county of Frontenac, and in the township of Maison-Neuve, Birtwhistle county, respectively. Mining operations have not yet been started on these locations, but it is not improbable they will develop into valuable mines.

MINING ON LAKE OF THE WOODS.

The Lake of the Woods promises to become a mining centre of considerable importance. The explorations which were actively carried on in 1882 and '83 received a check from causes wholly unconnected with the natural prospects of the district, these being principally the question of territorial jurisdiction, which prevented the issuing of titles, and the stringency of the western money market; but as soon as these impediments shall have passed away, there is every probability that the development of the discoveries already made and the search for new indications will be resumed in a more thorough and scientific manner.

Besides gold and silver the following metals and economic minerals have been found: copper, iron, zinc, lead, antimony, arsenic, iron pyrites, mica, asbestos, plumbago, marble, granite and hone-stones. The copper occurs as pyrites in veins and in schists and has been found by explorers in several places, which they keep secret until titles can be obtained by the discoverers. There is a considerable quantity of this ore in one of the veins at the George Heenan mine. Iron pyrites is abundantly disseminated in many of the rocks and is especially noticeable at the Keewaitin mine. There is a good prospect that large deposits of it will be found, worth mining for the manufacture of sulphuric acid. Veins containing plates of mica occur in connection with the granites, and during the winter just past a discovery is reported to have been made near Falcon Island of one of these holding sheets of a good quality, upwards of six inches in breadth. Fine specimens of true asbestos were obtained in making railway cutting through hornblende schists at Rat Portage, and small quantities have been found at other localities, indicating that larger deposits may be looked for. The marble is white, mottled and veined with grey and occurs at the west end of Hay Island and in other places. Syenitic granite is very abundant and may be seen in the cuttings of the Canadian Pacific Railway for miles east of Rat Portage. It occurs in upwards of twenty different places around Lake of the Woods. A fine variety which might be easily quarried may be seen at Bell's Harbor on Painted Rock Island, near the steamboat channel between Rainy River and the North-west Angle. A glossy greenish yellow silicious schist, very suitable for fine hones, has been met with in a number of places in the northern part of the lake.

The rocks in the Lake of the Woods region have been examined and their outlines mapped out by Dr. Bell, Assistant Director of the Geological Survey, who devoted parts of 1872, '73, '81 and '83 to exploring this part of the

country. During 1883 he was assisted by Messrs. Coste, Lawson and Tyrrell, and in 1884 the work has been continued by the two gentlemen last named. The results of all these examinations is to show that the auriferous veins occur in massive dark green diorites, contiguous to the larger granite areas and on their western sides. Mr. Lawson has observed that the gold-bearing quartz veins follow slaty or soft streaks in this diorite. These rocks belong to the Huronian series which occupies the shores and islands of the northern part of the Lake and is represented by a great variety of crystalline schists, conglomerates, felsites, &c.

Assays have been made by Mr. Hoffmann, the pains-taking chemist of the Geological Survey, of a considerable number of samples of ore from different localities on the lake, which show that the richest veins are those around Bigstone Bay on the north-east side of its northern portion. The veins at the Pine Portage, Sultana, Winnipeg Consolidated and Keewaitin mines proved to contain rich ore. Three of the assays of that of the Pine Portage mine yielded respectively 12.77 ounces gold, 20.41 silver, 9.68 gold, 8.92 silver and 9.91 gold, 15.37 silver, to the ton of 2,000 pounds. This mine was worked steadily by a small force of men during the whole summer of 1884, and the ore produced, together with what had been previously mined, was sufficient to give pretty steady employment to the five-stamp mill at the mine, and no scarcity of water for its supply was experienced. In the autumn, a second battery of five stamps was placed on the same cam-shaft as the first, the engine being originally intended to drive ten stamps. As a good deal of secrecy was observed last summer about all the discoveries and the mining operations at the Lake of the Woods, it was impossible to ascertain the amount of gold produced at the Pine Portage mine, but it is believed to have been between 150 and 200 ounces or some \$3,500 worth. In addition to the free gold thus obtained, the sulphides were concentrated by two Frue vanners and will be either exported or treated in time on the ground.

The Keewaitin mine was the only other which was worked during 1884. Operations were kept up all summer with a few men and the ore was taken in barges to the crushing mill at the Argyle Mine on Clearwater Bay. The result was said to be satisfactory, but from the general observance of secrecy no particulars could be obtained.

Although the quantity of gold which has actually been produced at the Lake of the Woods is small, still the progress which has been made towards its establishment as a mining district has been considerable and important. We have witnessed all the usual stages. First, the original discovery of the precious metal, next a good deal of promiscuous hunting and exploring accompanied by many reported assays of very rich ore, then the commencement of mining and milling, partly judicious and partly injudicious. Finally the district is surveyed geologically and reliable assays and mill returns are obtained and actual facts enough become known to justify the commencement of systematic mining and milling. The geological position and relations of the gold-bearing veins being pretty well established, the search for new mines may now be confined to narrow limits, that is, to the dark green diorites near the contact of the granite. The principal unexplored region would thus lie along this line of junction, which, as shown on Dr. Bell's map of 1881, trends south-eastward from the head of Big Stone Bay towards the arm to which Dr. Bell has given the name of Long Bay and new discoveries

may, therefore, be looked for behind Yellow Girl point and in that vicinity.

The principal places at which any work has yet been done are described by our Lake of the Woods correspondent in the REVIEW for July 1883.

Bristol Iron Mine.

In addition to the mines in Central Canada, which have frequently been referred to in the REVIEW, and from which iron ore has for some few years past been shipped to the United States, a promising mine is now in operation in the County of Pontiac. The mine, known as the Bristol Iron mine, is situated in the township bearing that name, and comprises lots 21 and 22 in the 2nd range. There are two lodes on the property having a north-westerly and south-easterly course, the most northerly one of which is now being worked. At its east end two openings have been made and a slope started at a dip of 60°. Eight hundred feet westward on the lode a 12x30 ft. shaft has been sunk to a depth of 50 feet in very rich ore, from which two levels are being driven, one to the east and the other to the west, the former to connect with the slope, and it is expected the connection will be made by the end of next September. During the past winter 7,000 tons of excellent ore was raised, 3,500 tons of which was delivered at Braeside, a station on the line of the C. P. Ry., from which point it will be forwarded, via Kingston, to the company's works at Charlotte, N. Y. The force of miners and labourers engaged averages 40 men.

There are three steam-drill, suitable hoisting machinery and two boilers on the property. The company is determined to thoroughly equip this mine and has purchased an air compressor capable of working ten drills. A powerful hoisting engine 14x36 stroke is about to be erected to work from the shaft and slope. The shaft will have two cages, and the slope is to be double-tracked. It is expected that all the improvements will be in running order before the autumn, and that thereafter the output of the mine will be not less than 75,000 tons annually. The ore is a high grade magnetic, assaying 65 per cent. metallic iron. This mine will unquestionably be an important producer, and will contribute largely to the shipment of Canadian iron ore into the United States.

NORTH SHORE OF LAKE SUPERIOR.

ITS MINERAL RESOURCES.

In a recent number the Chicago *Mining Review* publishes an interesting letter from a Port Arthur correspondent, "North Shore," as follows:

In my last communication about the mines north of Lake Superior, which dealt chiefly with the mines to the west of Port Arthur and the mining district in the State of Minnesota, adjoining the Canadian border, I promised another, having reference to other portions of the vast mining field on the north shore, on the Canadian side.

Before proceeding to fulfill that promise a few words more relative to the new silver region, commencing at the Kaministiquia River and extending through the township of Paipoonge, the Rabbit Mountain and Silver Mountain districts to the international boundary, may be found to be of general interest, inasmuch as this is the section of country which is attracting

the most attention at present, and in which the greater development is in progress.

A letter which appeared in a recent number of the *Mining Review*, over the signature "Calcite," contains much valuable information respecting the silver slates of the Thunder Bay district, and it is specially applicable to the geological formation and the general character of the mineral veins which are to be found in what is now known as this new silver district. By it the writer gives some good reasons why the veins to be found in this portion of the country can be classed as true fissures, and he gives reasons to show that their mineral features may be relied upon in depth as well as at surface.

Whether the mineral properties of these veins came from great depth or from infiltration by minerals in a state of solution, that is to say, from the leakage from the rocks or the movement through the rocks and veins themselves of waters highly impregnated with mineral ingredients, whether from above or from the surrounding rocks, or from steam or vapor or influences from great depths and infiltration from above combined, are disputed theories. All geologists agree, however, that the trap dykes which cut the formation of this mineral region have had much to do with the mineral features of the veins, but exactly how their influence has been exerted has never been determined. The fact that these dykes are found to be mineralized to a much greater degree than the surrounding country rock, and the well-known affinity which minerals are known to have for each other, may account for the veins intersecting these dykes and along the line of their junction with the slates, making richer in, and in the neighbourhood of, the dykes than in other portions of the vein. At Silver Islet the richest ore was found in the dyke which its vein intersects. This dyke is highly mineralized. The same vein on the main shore in the slates contained no trace of silver; at any rate, it was not found rich enough here to pay to work.

There are other reasons than those given by "Calcite" which tend to prove the permanency of silver in depth in the veins of the Thunder Bay district. The development of Silver Islet exploded the theory once held that silver was only to be found at surface in this district. At this mine there was found very rich silver at surface, and also at various depths. At 960 feet, and even deeper, very rich ore was taken out. Again, allowing that "Calcite" is right in stating that the slates have a dip to the south-east, then it could be shown that the slates which outcrop in the Rabbit Mountain district, where such rich silver ore has been found at surface, would on their incline be found hundreds of feet below the surface at the Silver Islet mine, and particularly the islands and country west of it in the same formation. Again, silver is found at surface on different planes to the north-west of the Rabbit Mountain mine, at the Beaver mine, two miles distant, and to the west at the Twin City mine, three miles distant, and to the south-west at Silver Mountain, fourteen miles away. By allowing for the dip of the slates the same argument would apply to show that silver may reasonably be looked for at great depth at the Rabbit Mountain mine. And so on the argument can fairly be used to show that at no particular horizon of the silver slates does the silver only show. The line of slates to be found at surface in one locality would be hundreds of feet deep at other places in the same formation, and as silver was found both at surface and in depth at Silver Islet, the question of the permanency of silver in depth in the veins of this district may be considered settled, although as "Cal-

cite" says, it makes richer in zones or pockets than in the intervening veinstone. That is the case with all silver mines, the difference between the veins of the Thunder Bay district, and those of other countries being found chiefly in the fact that where the silver in the former makes rich, it is exceptionally so.

As to the kind and character of the veins, it cannot be doubted that the Silver Islet and Beaver veins which cut the formation and the dykes in their course are true fissure veins. They have actually disclosed the dykes, which they intersect, and made faults in the formation. The same may be said of other well known veins in the district which have the same evidences to prove them true veins. As to those running with the formation, their mineralization, length, regularity of course, their dip, cutting the formation at an angle, and their well-defined walls, where the depth has been reached, are evidences that they too are true fissures. Why the most of these veins make rich in places, producing a very high grade of smelting ore, and only stamp or very poor ore in other portions of them, is not for me to divine. It is sufficient to know that such is the case. "Calcite" points out certain conditions in the walls or country rock in the vicinity of these rich deposits which may account for them, but what caused these peculiar changes in the formation is a more difficult question.

Then as to the influence of the trap dykes on the mineral features of the veins, there has not been development enough in the country to lay down any general rule or law. In the veins in the slates which have shown silver away from a dyke the development has been very limited. Remarkably rich silver ore has been found in the Silver Islet and Beaver veins, which cut dykes, but in the Beaver rich ore is also found in the slates, disseminated all through the veinstone at considerable distances from the dyke, and as far away from it, and to as great a depth, as the vein has as yet been uncovered and cross-cut down the mountain side. It is true, too, that the Silver Creek mine or 95 T vein, on the location adjoining the Twin City mine, shows rich silver ore in its outcrop. This vein runs with a dyke which forms one of its walls—the silver slate forming the other wall. The development about to be commenced at this mine will doubtless prove it to be as rich as the Beaver, Rabbit Mountain and Twin City, the three working mines in its immediate vicinity.

On the other hand, the Rabbit Mountain mine, which produced such wonderfully rich ore at surface, and at a depth of 75 feet in another shaft, and the Twin City mine, from which such very rich ore has been taken, have not yet been proved to be dyke veins. The companies operating these have not had time to do development enough to settle this question. Notably among this class of veins is the Silver Mountain vein, farther to the south-west. It is not known to be a dyke vein, and yet a mine could scarcely produce richer silver ore than has been taken from the test pit on it. At the Rabbit Mountain mine solid nuggets of argentite (black silver) weighing as much as five, six, and up to eleven pounds, have been taken from near surface in one shaft, as well as ore going over \$3,000 to the ton at a depth of 75 feet in another. At the Silver Mountain mine there has been broken off in the test pit fragments of ore weighing sixteen pounds and upward, worth \$10 per pound, and it is said that during a recent examination of the mine by three experts from Chicago, one blast upturned over \$6,000 worth of ore from less than a ton of the veinstone. The Twin City mine produces a very high grade of smelting ore as well as stamp rock in quantity. Further devel-

opment only can prove whether these three mines will ultimately produce as good a yield as came from the celebrated Silver Islet dyke vein, which has a record in production of over \$3,000,000. The Beaver mine, although in a vein cutting a dyke, can be classed as a valuable producing mine from the ore opposite both the dyke and slates, but it has made no shipment of ore. Therefore its history, which is only a few months old, cannot as yet be taken to prove that the veins cutting dykes like the Beaver, or in contact with them, like the Silver Creek mine vein, will prove the greater producers ultimately.

What is most required is greater attention to the low grades of ore which all these mines and nearly all the veins in the district yield. When it is better understood that the low grade ores such as these veins produce can be mined, treated and converted into bullion at the mines for less than \$5 per ton by the latest improved methods of mining, handling and treating such silver ores, and when the large production to which the mines can be raised is figured out, the real undoubted value of the veins of low grade ore will be better appreciated and known. Were it not that such marvellously rich ore is to be found in places in the veins of the district, the owners of them would be forced to go to work at opening up their mines in a proper way with a view to mining on a large scale, mines properly opened up for large workings, instead of picking around, or "hogging" over the veins, trying to find and follow only the very rich leads of silver, as in most cases is done, regardless of the consequences and extra expense afterward attendant on an improper start and plan of development.

Around these mines, and in different localities in what is called the New Silver Region, there are very promising veins wholly undeveloped awaiting capital and experience to handle them. This country has but few practical miners.

As to the other portions of the vast mining field on the Canadian North Shore of Lake Superior, to which this letter was first intended to be confined, the developments are not sufficient to call "mines" which are now mere "prospects," except in the case of the Huronian mine, which is undoubtedly a good one, although it has been slow at getting down to practical business. Such a mine in the Western States would have been working at the rate of at least 100 tons per day production by this time, but here it can scarcely yet be said to be more than partially tested and in a position to start at real work. At this mine there is a fine mill and a splendid vein, highly mineralized throughout its entire length and with clean cut walls. It is capable of being made a large, reliable, steady producer, and yet it has made no headway worth speaking of in systematic mining and milling.

In the same geological formation as the new silver district are to be found veins cutting the same dyke as the Silver Islet vein on the islands west of it, and on the main shore running along and inland from Big Trout Bay, which should be explored and further developed. Some of them have never had any development work done upon them.

To the east of Port Arthur are the Beck or Silver Harbor and 3A mines, which, although now idle, would pay handsomely under proper management. The history of these two mines is not properly understood, or they would be at work. Of this fact there can be no doubt from the evidences to be had from various parties now living in the district. The question of title, if that is the cause of their remaining idle, is one that could be settled, no matter if at some expense and sacrifice, were prudence and

energy exercised. The Beck mine is in the same silver slates, and the ore on its dump today is said to be all good pay rock. It, too, has produced very rich ore. The same can be said of the 3A mine. It is a rich mine, although a small vein in the contact between the Cambrian and Huronian formations. As to those mines or holes in the rocks, which were once started only for stock-jobbing purposes, no references need be made. They died a natural death.

Silver has been found near Blende Lake in veins which development might prove lucrative mines. The same can be said of the veins west of Little Pic River and further east. The Heron Bay gold lode, which so much resembles the Huronian mine ore, the small gold vein at Jack Fish Bay, the veins in the gold formation of that neighborhood, are all sufficiently enticing to warrant exploration and development. Some of them have not been tested. Others are known to contain a grade of ore that would likely pay well under proper management.

The zinc blende property northeast of Neepegon Bay is one that promises well and will likely go to work during the coming summer.

The gold country in the Huronian formation, commencing above the Kakabeka Falls, on the Kaministiquia River, and extending in irregular shape to the international boundary and beyond the Height of Land, is but very partially explored. It is known to contain some veins of splendid promise. The Jack Fish Lake lode is a fine one in this formation with length, breadth and unknown depth, being a true fissure, sufficient for several mining companies. It produces both gold and silver, and in places the rare sylvanite ore. The Partridge Lake lode is one of good promise, and the country around it and the Huronian mine is geologically and in fact a gold-bearing district. The veins in the Huronian gold formation nearly all produce low-grade ores, but they are considered very reliable and constant in their average yield.

The unsettled state of the title to the land beyond the Height of Land, keeps that portion of the district back, but there can be no reason why work should not be commenced on the locations which were patented while the arrangements existed between the Dominion and Ontario governments which allowed grants to be made. There is no dispute about the whole of the new silver region and the vast mining district south and east of the Height of Land, and along the entire north shore of Lake Superior, where patents can be procured from the crown for ungranted lands for one dollar per acre and surveying expenses, which rarely exceed another dollar per acre, making the total cost of unpatented lands not more than \$2 per acre, with no royalties or other crown dues on the minerals. The Ontario mining law is a very liberal one, almost too much so.

The Canadian Pacific Railway has opened up a large portion of the country. The Ontario Government has given a grant to build a bridge across the Kaministiquia river opposite Murillo station, on the C. P. R., and toward the construction of a waggon road into the new silver region referred to. The Thunder Bay Colonization Railway has been chartered to serve this same district. The construction of the bridge and waggon road mentioned will be commenced this spring, and it is expected the railway will soon follow. The mining country is well watered and as a rule is surrounded with good mining timber. The climate, although severe in winter, is healthy and invigorating, and the mines can be worked with cheap labor the year round.

To such a vast mining district, with such a promise, explorers, mining men and capitalists

must soon come in numbers and with means. The opportunities now are great and are only excelled by the resources of the country. The coming summer will be an active one in the district. The opening of navigation will be the watchword and development and production the reply.

BRITISH COLUMBIA MINING PROSPECTS.

THE WINTER'S WORK AT GOLDEN CITY.

Golden City is situated at the junction of the Kicking Horse River with the Columbia just where the C. P. R. leaves the narrow canyon through which the former stream passes and enters on the broad and beautiful valley watered by the latter. On the east of the town are the Rocky cuts, and on the west the range of the Selkirks. As far as surface indications indicate, the mineral wealth near the place in the latter range could hardly be more satisfactory. There is every appearance of true fissure veins running across and slightly quartering the mountains. The latter have a general direction N.W. and S.E., while the leads seem to run slightly E. of S. and W. of N.

Mr. McConnel, of this place, has formed a company to work six claims about 12 miles south. They have been working all winter on one of their claims, which shows a well-defined lead of gold and silver bearing rock, and have made 65 feet of a tunnel into it.

At Canyon Creek, which runs into the Columbia, a company of Winnipeggers, which includes some men of good standing, is working at two large post holes in the bed-rock of the Creek, under the direction of Mr. Kelly. They have made a flume 136 feet long capable of carrying off 750 cubic feet of water a minute, and a pump which will carry off 18,060 cubic feet in 24 hours. They are putting the finishing touches to their dam and intend, shortly, to start sluicing, and will soon afterwards know what their claims are worth.

Mr. F. McGuire, an old timer both in this country and the N.W.T., has two claims on Fifteen Mile Creek, which empties into the Columbia above Canyon Creek. He has named them the Ureka and the Sierra Nevada. The foothills of both are granite, and the hanging walls slate. The Ureka, which is the richest, has a width from footwall to hanging of nine feet. The assays of these leads were made in London, England, and have been very satisfactory, and a mining expert is to be sent out from there in June to examine the claims. Besides these claims there are about fifty others of varying richness on the same Creek. Mr. McGuire intended to start operations on his location early in April, by which time there was every prospect that the snow would have disappeared from the lower levels.

There is a report that Mr. Dan Mann, who owns six claims on Fifteen Mile Creek, intends to cut a waggon road up there this spring.

At the north of the Spill Amichene, 60 miles above here, Mr. Jones has a big Galena lead with great quantities of ore in sight, which he has named after that river. He has already started out to begin operations. Besides this lead another of free milling gold quartz has been discovered up the same river, which in the opinion of old miners will go at least \$50 to the ton.

On Quartz Creek, about 85 miles below here, a company under the direction of Mr. Graham, has been putting in the winter developing a

lead, from which rock has been assayed at Salt Lake City, Utah, with the most favourable result.

In fact it may be said that unless the indications of mineral wealth which are visible in this section of the country are capable of attracting capital into it nothing will. Not only are the mining prospects most favourable, but this region affords advantages to the capitalist in every way. The timber is abundant, and of a kind peculiarly well adapted for smelting purposes. Water power can easily be obtained if required, and no lead has as yet been discovered within two miles of which a railroad could not be run with the greatest facility from the main line of the C. P. R. If the claims 'round here cannot find buyers this summer prospectors may as well quit on this side of the lines altogether. If capital does not come in there must be something wrong in the country, since it certainly is not the fault of the mineral prospects in it. At all events there have been before now big stampedes, and big money made too, on the other side on considerably slimmer indications than those which present themselves in this section of British Columbia.

PROFESSOR WILBER'S REPORT ON THE CANADIAN PACIFIC RAILWAY.

FUEL SUPPLY OF THE NORTHWEST TERRITORIES —BITUMINOUS, ANTHRACITE AND LIGNITE COALS.

Professor C. D. Wilber, of Aurora, Illinois, Inspector of Mines and Mining Lands, who last year made a geological survey of the line of the Canadian Pacific Railway, has made a lengthy report to the managers of the road. After showing the rich agricultural resources, he gives his views on the coal supply for the region of country contiguous to the line of railway, as follows:

"It will be interesting, especially to English and Canadian readers, to know the sources of coal for the vast region now intersected by the new Canadian Pacific Railway. This area comprises the Provinces of Manitoba, Alberta, and British Columbia. Here is an immense wilderness of both flat and rolling prairie, of grassy plains and magnificent rivers, having a soil capable of husbandry and herding, as is proven to-day by thousands of new farms, where so recently prevailed the wild and hopeless monotony of nature.

"Into this unmeasured domain nearly 2,000 miles in length east and west, by at least 400 in width north of the 49th parallel—the international boundary—are coming, with the facilities of this new trans-continental railway, now being constructed by the Government, hundreds of thousands of the more hardy populations of the northern latitudes of Ontario, Quebec and northern Europe, already accustomed to long winter terms. Coal supplies for the eastern portion of this new region will come from the Souris river lignites already referred to.

"The middle region can be supplied from Medicine Hat and Belly River coal districts which also afford lignites. The last named coals are inferior in quality, that is, not compact, having a heavy per cent. of ash and moisture and easily disintegrating in the open air. But notwithstanding they are the lowest order of cretaceous coals, yet the necessities of a six months winter will compel their use and distribution by rail on an extensive scale.

"Beyond Calgary which is destined to become the leading city of the Northwest Terri-

tory, coal is found of a quality far superior to the lignite of the plains just referred to.

"A field of anthracite coal has recently been found near Cascade mountain on the Canadian Pacific Railway 900 miles west of Winnipeg. It has been traced in a direct line on its outcrops for several miles, and at intervals pits or shafts have been dug to prove the regularity and persistence of this anthracite stratum. About 300 tons have been mined and shipped to the east, and from this amount, sufficient tests have been made, to prove not only its value, but also its identity as a true anthracite coal.

"In the western States and Territories it is a universal fact, that the grades of coals, in quality or value, increase towards the Rocky Mountains as follows:

"1. We have loose or spongy lignites; 2. Compact or solid lignites; 3. Semi-bituminous; 4. Anthracite.

"A correct outline map of the productive coal limits of the Western States and Territories must be vague and uncertain, especially on the south.

"But the coal area rapidly increases with every succeeding parallel going north. This area is over 200 miles wide in South Colorado. While in Northern Colorado from Greeley westward, across North Park to the coal fields of Utah in Great Salt Lake region, the width of the coal area is nearly 600 miles.

"Through Wyoming, beginning in the Black Hills region, the coal area extends into Idaho, and includes several deposits of great size and value, notably one near Evanston on the Union Pacific Railway, having a thickness exceeding 40 feet; easily traceable several miles northward in the Bear River Valley. But on the other hand, it is quite contrary to expectation, yet a fact, that the country nearly 900 miles west of Ogden, including both Nevada and California, is almost if not quite destitute of coal. We find the greatest width of coal area is spanned by the 49th parallel, or the international boundary, reaching from the Souris River coal system to the Pacific coast, with considerable areas intervening that are destitute of coal, both in Northern Idaho, Montana and Manitoba.

"North of this line we have already followed the route to the Canadian Pacific Railway, with results as above stated. Still further to the Northwest, 200 miles north of Calgary, in the vicinity of Edmonton, are found large areas of excellent coal exceeding 12 feet in thickness, extending thence west to the head-waters of the Athabaska, and across again to the Pacific coast.

Mining Notes.

NEWFOUNDLAND.

A statement just issued by the St. John's Chamber of Commerce for the year ended July 31st, 1884, shows that 9,536 tons of copper ore and 133 tons of copper regulus were exported.

Owing to the unprecedentedly low price of copper, all mining operations at the Betts Cove mining district have been indefinitely suspended. These mines were formerly owned by a Boston and New York syndicate. The output of ore within a few years has been over \$6,000,000.

NOVA SCOTIA.

The fire that had been burning for some time in the Sydney, Cape Breton, coal mine was extinguished towards the end of March and the mines are now in operation. All hands have been working on the south side, double shifted.

The largest output ever made at any colliery in Canada has been attained at the Spring Hill collieries. Three slopes are now working and an average of fifteen hundred tons of coal is being raised daily. Sixteen hundred and ninety-three gross tons were shipped by rail April 7th.

A dispatch from the superintendent of the Oxford gold mine, Lake Catcha district, dated April 13th, says that the plates will probably be in place and running on the 13th. Every available space is now filled with ore. They were obliged to stop mining until the mill was ready. Meantime, they have sunk shafts Nos. 12 and 13 on Coleman lead, each 12 feet deeper, showing vein 2 feet wide and increasing with depth both in quality and width. As soon as the snow disappears, it is the intention to open new leads that are known to be on the property.

The new steam-hoisting works on the Orion lead at the Hall-Anderson mine started up on the 7th of April. The vein is showing well and is opened for 100 yards at a depth of 80 feet, averaging 3 feet wide, the pay-streak being about 2 feet wide. The most important strike ever known in the district was made April 9th on a cross cut at a depth of 70 feet, 40 feet north from the Island lode; a lead was cut 3½ feet wide of solid quartz showing free gold throughout. The value of this discovery can only be ascertained by developing the lead, which will be done at once. The company has only a ten stamp mill at present, but intends increasing to 20 stamps immediately, and later on to 40 stamps, as the ore is there to supply even a greater number of stamps. The ore is of low grade, running from \$10 to \$25 a ton.

NEW BRUNSWICK.

The Brunswick Antimony Company gave shareholders whose stock was sold for non-payment of the \$1 assessment on March 31st, the privilege of redeeming it at \$1 a share until April 15th.

QUEBEC.

The Villeneuve mica mine is improving noticeably with development and is yielding abundantly. The quality and size of the plates shipped from the mine during the past month cannot be excelled at any mine in the world.

Activity at the phosphate mines in Ottawa County continues unabated, and with the opening of navigation on the River du Lièvre, which is expected during the first week in May, the output of the mines, which has accumulated during the past six months, will begin to move.

The Bristol iron mine, in Pontiac County, is becoming a large producer of very fine ore. Seven thousand tons were mined during the past winter, and with the machinery now being erected, and when more ground is opened, the annual output of this mine will reach 75,000 tons. The ore is shipped to Charlotte, N. Y.

Mr. J. Frazer Torrance is continuing to prospect what is known as the Armstrong location, about 25 miles from the village of St. George, county of Beauce, and is meeting with success. He has already located some extensive leads of argentiferous galena, carrying silver in paying quantity, and sufficiently rich to warrant systematic mining operations.

The Capelton copper mines in the Eastern Townships have been worked at large profits for the past three years or more, and continue

to yield abundantly. The ore is chiefly pyrites and is shipped to New York and Brooklyn to be smelted. This ore is very valuable on account of the quantity of sulphur it contains and is worked chiefly for sulphuric acid.

Work has been resumed at the Asbestos mines in the Eastern Townships. It is expected that several undeveloped properties will be worked during the coming summer. A large force of miners will be employed at the mines in Thetford, Coleraine and Broughton Townships, and at Danville. The Johnson and Boston Asbestos Companies expect a very large output from their mines this year.

The Beauce gold mines are being vigorously worked and very satisfactory results are looked for from this season's operations. The Canada Gold Company is prospecting its territory systematically and has proved several quartz ridges to be rich in gold. Good work is being done on the Gilbert river, and Messrs. Allan and Humphrey have sunk their new shaft to within a few feet of the gravel. They have now reached a depth of 155 feet and for some distance have raised ground carrying several colours to the pan. The gravel at *bed-rock* is unquestionably very rich and there is no doubt that these gentlemen will be handsomely rewarded for their pluck and perseverance.

ONTARIO.

The outlook in the Thunder Bay mining district was never brighter than now.

It is stated that three new mining and manufacturing companies have been organized with large capital to operate in the Thunder Bay district.

On the north shore of Lake Superior the recent discoveries of various economic minerals is attracting the attention of mining men and capitalists.

The Ontario Government is about to build a bridge across the Kaministiquia river for the accommodation of miners to whom it will be a great boon.

Three silver mines are now being developed in the Rabbit Mountain district, namely: the Rabbit Mountain, the Twin City and the Beaver mines.

There has been considerable prospecting and active mining in the gold formation and the silver bearing district north of Lake Superior, and with satisfactory results.

It is the general impression in Duluth that with the opening of navigation will come a rush of mining men from the western states to operate on the north shore of Lake Superior.

Mr. Ryan, the millionaire hotel man of St. Paul, is looked upon as a likely purchaser of the Silver Mountain mine, owned by Messrs. Daunais and Trethewey. The price for the property has been set at \$300,000.

The Huronian mine is said to be one of the most valuable gold properties of the Thunder Bay district. The vein has an average width of 6 to 7 feet and has been traced for three quarters of a mile in length. The quartz carries free gold throughout.

Mr. Keefer, of Port Arthur, who has recently returned from New York, reports that

the last car-load of ore shipped to that city from the Rabbit Mountain mine was divided into four grades. No. 1 yielded 3,374 oz., No. 2, 1,251 oz., No. 3, 184 oz., and No. 4, 133 oz. of silver to the ton.

A number of valuable discoveries have been made in the new silver region in the district of Thunder Bay, commencing at the Kaministiquia river and extending through those portions of the country known as the Rabbit Mountain and Silver Mountain districts, on to Whitefish Lake, Arrow river and Pigeon river, the international boundary between the Province of Ontario and the State of Minnesota.

BRITISH COLUMBIA.

On 26th March a young man named James Blair was killed by a *cave in* on the Mason claim, Antler Creek. The body has not yet been recovered.

The Lorne Creek miners sailed from Victoria on 26th March on the steamer "Barbara Boskowitz." They were heartily cheered as the vessel moved off.

Gold diggings have been struck on Beam Inlet which give promise of richness. The quartz mill on Douglass Island is nearly completed and crushing will soon begin.

Mr. Smith, Superintendent of the Irondale Works, left Victoria at the end of March for Texada Island. He took with him a gang of men and supplies and is now engaged in preparing for mining operations. Mr. Smith speaks very highly of the excellent quality of the Texada iron ore, which he says is superior to any on the coast.

John Morrison, who has returned to Victoria from a prospecting tour through the Pitt river mountains, brought with him some fine specimens of iron, copper and marble. He also has some quartz which is supposed to contain gold and silver. He says that the mountains are full of mineral wealth and predicts a great future for the mining interests of the Province.

Messrs. J. L. Ferguson, P. Cran, B. Carter, S. Hughes and two others have started from Desolation Sound for the mainland, on a prospecting tour for minerals and timber. They expect to be absent about six weeks. Mr. J. L. Ferguson of the Britannia hotel, Victoria, several months ago visited that Sound, and found fair prospects of gold, silver and coal.

Wm. Kemp and M. Hilton, two well-known miners who went to Kootenay about ten months ago to prospect, were not heard of until, during the past winter, their horses were found in the woods along with a human skeleton. Among papers found on the clothing was a miner's certificate with Hilton's name. Without doubt these two enterprising prospectors have met with a horrible fate.

Messrs. W. F. Murray and C. D. Grant, of New Westminster, who have been prospecting for the past several months in the New Westminster district, report the discovery of a rich lead of silver a short distance from Fraser River near the Mission. The lead extends for about two miles, from 10 to 40 feet wide and in sight to a height of 100 feet. There are a series of veins of the galena ore in the same vicinity.

Mr. Murray has proceeded to San Francisco for the purpose of having a sample of the ore

assayed. He has been a prospector in Arizona and New Mexico for several years and states that the ore is as rich as any he has met with. Mining experts to whom the specimens have been shown pronounce them exceedingly rich. In the same neighborhood was found a lead of gold quartz, the specimens in Mr. Murray's possessions showing considerable gold. A vein of zinc was also noted.

The Consolidated Monarch Mining Company, who own the claim at Tunnel Mountain, will soon begin operations. The lead consists of galena, and the ore, which has been assayed at Minneapolis, Chicago and Salt Lake City, goes 34 oz. of silver and 65 per cent. of lead. Mr. Biscoe, the agent of an English company, which intends taking over these claims, has gone to England to make arrangements for getting the ore smelted at Swansea.

Parties who have recently arrived at Victoria from the upper country report having passed a couple of men with pack animals near the Salmon arm, bound for Kamloops. The animals were laden with quartz, which the men stated was rich in silver, and, while not giving much information about it, claimed that they had struck a rich lead and were bringing a sufficient quantity for the purpose of having it properly assayed. From what is told it would seem that the *find* was made in the gold range near the Salmon Arm and the line of railway, and in a line with the old Cherry Creek mine.

Reports from the mines in the Cariboo district are encouraging, good pay being taken out all winter on Lightning creek from the Ross and Van Winkle claims. On Slough creek the Chinese also have been very successful. The unfortunate *cave in* of the Mason claim on Antler creek may possibly have the effect of the abandonment of that shaft. The accident was a most peculiar one. When the mass fell the force sent huge pieces of timber to the mouth of the shaft and threw mud to the roof 30 feet above. The man killed came up feet first and again sank, while the one saved luckily came up head foremost and seeing daylight threw his hands out and grasped the ladder.

Work is not now being prosecuted on the Burns mountain tunnel, but will be resumed when the season advances. The tunnel is now 750 feet in length, and another 50 feet will bring it to the point where the ledge is supposed to be. Mr. Wm. W. Dodd, who has recently arrived at Victoria, brought with him a piece of gold quartz taken from the tunnel, a very rich and pretty specimen. He has still unbounded confidence that the final result will handsomely pay the plucky promoters of this novel mining scheme.

UNITED STATES.

Last year the dividends derived from gold, silver, lead and copper mines in the United States aggregated \$8,472,896.

The result of the past twenty-three months' operations of the Plymouth Consolidated Gold Mining Company, California, is evidence of what can be done with a good mine under proper management. During the period mentioned this company has paid to its shareholders \$1,150,000 in twenty-three consecutive monthly dividends of \$50,000 each, equivalent to \$11.50 per share.

The most important dividend-paying mines of the United States are: The Homestake Mining

Company, Dakota, has paid, up to the 25th March, 1885, no less than seventy-eight successive monthly dividends, aggregating \$2,637,500; the Ontario Mining Co., Utah, to the same date has paid \$6,275,000 in one hundred and five monthly dividends; the Small Hopes Con. Mining Co., Colorado, since February, 1884, has paid \$1,037,500 in fifteen dividends; the Idaho Gold Mining Co., California, has paid one hundred and eighty-one successive monthly dividends, aggregating \$3,667,300; the Father De Smet Con. Gold Mining Co., Dakota, has paid \$980,000 in forty-three successive monthly dividends; the Jocuistita Mining Company Mexico, has paid \$1,200,000 in fifteen quarterly dividends, and the Hecla Consolidated Mining Co., Montana, has paid six dollars per share yearly for several years. The Horn Silver Mining Co., Utah, paid in quarterly dividends up to 15th November, 1884, \$4,000,000.

Australian Gold Notes.

The yield of gold from mines in the Ballarat district, 2,079 oz., 17 dwts.; from the Creswick district, 2,507 oz.; from the Sandhurst district, 6,919 oz., 1 dwt.; from other districts 4,961 oz., 10 dwts. Total yield for the week from the returns sent in (Feb. 7), 16,469 oz., 10 dwts., value about \$150,000.

Dividends for the week (February 14) from ten Victoria gold mines were £12,244, or \$61,000. The Victorian yield of gold for 1884, calculated on the usual basis, shows an increase over that of 1883 of 43,957 oz. In 1883 there was a falling off after three years of high production; but gold mining is again in the ascendancy, and the outlook for this year is very hopeful.

The following are the returns from the under-mentioned mines during the four weeks ending Saturday, February 7: New North Clunes Company, 309 oz., 11 dwts., 12 grs.; New Yankee Company, 82 oz., 1 dwt.; South Clunes Company, 405 oz., 4 dwts., 12 grs.; Port Phillip Company, 455 oz., 19 dwts., 12 grs.; Bute and Downs Company, 404 oz., 4 dwts.; New Lothair Company, 40 oz., 8 dwts.; other sources, 150 oz.; making in all 1,845 oz., 8 dwts., 12 grs., value \$36,500.

Asbestos, its Manufacture and Uses.

Asbestos mining having become such a very important industry in Canada, and as the product of the mines in the Eastern Townships is now admitted by manufacturers, the world over, to be unexcelled in quality, we publish, for the benefit of those of our readers who are not informed as to the variety of uses to which this valuable mineral is put, the following very interesting article which has appeared in the *Engineering and Mining Journal*, N.Y., of a recent date:—

"Asbestos is a fibrous variety of actinolite or tremolite, and consists of silica, alumina, magnesia, oxide of iron, and water. It has been known for many hundreds of years, and indeed it is reported that asbestos cloth was used on the funeral pyres of the ancients. Whether that be true or not, it is certain that until recent years asbestos has been regarded merely as a kind of scientific curiosity, valuable as an illustration of the wonderful diversity of nature, but of little practical use in the world. A few years ago, almost simultaneously, a movement was set on foot in England, Scotland, and Italy,

and asbestos began to be mined and to be manufactured, at least in an experimental way. The time was opportune for the new venture. For years, steam pressures had been gradually rising, and whereas 30 pounds to the square inch at sea, and 50 pounds on land, had hitherto been the average, these pressures were now beginning to be doubled, and the old forms of packing for joints and glands showed great distress. Gasket rings and hemp gland packings had both been superseded by more durable and compact appliances; but these were far from perfect, and when exposed to the higher temperature that was evidently coming it was certain that they would give trouble.

In the year 1879, three firms that had entered into the mining and manufacture of asbestos formed themselves into one company, and a rigorous search was made through the region of the Italian Alps, where asbestos was known to exist, to discover all the sources. The result of several surveys was the discovery of about 180 valuable mining properties, covering 80 square miles of land, in districts about 80 miles from Milan. All these mines were secured by the company.

The Italian asbestos lies in beds and pockets, which are mostly reached by open quarrying, dynamite being largely employed in this operation. The lumps, as they are taken from the mine, consist of bundles of hard fibers, lying parallel with one another, and strongly bound together. They vary in color from light gray to brown, and the general appearance of a fine sample of asbestos is suggestive of the interior of the riven trunk of a tree. By the exercise of a little care threads may be separated many feet or even yards in length, the continuity being perfect from end to end, the general appearance and strength being very similar to those of flax. It is this quality of length and strength of fiber, and its chemical purity, that distinguish Italian asbestos from all other. The mineral is pretty widely diffused; it is found in Canada, Corsica, the United Kingdom, and in many other places, but in most of these countries it presents a very different appearance from that we have already described. Instead of the bundles of fibers being several feet in length, they are broken up into short pieces of only from 1 inch to 3 inches, and are bound together with such rigidity that the woody appearance of the fracture is nearly lost. Another peculiar characteristic of the Italian asbestos is the greasy feeling that it possesses, resembling that of French chalk or soapstone. When the material is manufactured into gland packings, this quality becomes valuable, as it prevents the necessity of introducing any foreign substances, and permits a perfectly pure packing of asbestos, through which the rod will slide with light friction, and with less oil than other kinds.

The manufacture of asbestos is carried on in several places in England. The chief seat of the industry, is, however, at Harefield, near Rickmansworth. All the asbestos goods used by engineers may be classed, as regards their process of manufacture, under two heads—paper and yarn. The paper may be worked up in various ways, and the yarn may be twisted, plaited or woven, but the crude material is made to assume one of these two forms before it is worked into the finished article.

There are several other branches of manufacture, such as boiler covering, putty, cement, patent fire-proof paint, etc.

The crude asbestos is brought from Italy in bags containing from 1 cwt. to 2 cwt. each, in pieces of all sizes, from that of a man's hand to such as a man can scarcely lift. These have first to be opened out to free the fibers from one

another and from the non-fibrous material by which they are bound together. For this purpose, two rollers covered with teeth of pyramidal form are used. These revolve, as a rule, at equal peripheral speeds, and at the same time have a sideways motion in relation to each other, so that the asbestos, which is fed in with the fibers lying parallel to the line of motion, is both crushed and separated at the same time. By the direct pressure, the binding agents are separated, and then the loosened fibers are combed apart by the reciprocating motion, which, however, is not sufficiently great to interfere with their parallelism. The lower roller is driven directly from the prime mover, while the upper is operated by a train of gearing that allows the distance between the two to be adjusted. Each roller shaft is connected by a collar and a connecting rod to a reciprocating beam, which receives its oscillation from an eccentric driven by a pulley and belt. Thus, when the machine is at work, the rollers are both rotated and drawn backward and forward at the same time. The toothed wheels are, of course, secured by feather keys, to render this possible.

Three machines of this kind, but of gradually reduced sizes, are employed to open the asbestos, and then the portion with the longer fiber is taken to the boiling-tanks, to be softened by heat and moisture. Each tank is provided with a rotating beater, which maintains a thorough circulation, taking up the fiber, opening and drawing it out, and then sending it forward to be soaked for a time until it comes around again to the beater. The short fiber is taken to edge-runners and ground, and prepared for the beating-engines, where the binding material is added and thoroughly incorporated: the whole is drawn off into a receiving-tank in the mill-board machine-room. From the tank, it is conveyed to the mill-board machine, to which agitators are attached to keep the fiber from settling. The water is drawn off through a fine wire gauze on a revolving cylinder, leaving a thin coating of the asbestos pulp in the cylinder. This is then taken off by an endless band and transferred to a second solid rotating cylinder, where it steadily accumulates until the desired thickness has been reached. It is finally cut across and removed in the form of a square sheet of millboard or paper.

The sheets, as they come from the machine, contain a large percentage of water, which is removed partly by pressure, and partly by drying. They are first laid between sheets of zinc in a powerful hydraulic press, and much of the water is forcibly expressed, and then they are hung up by spring clips in a steam-heated drying-room, to complete the desiccation. When the process is finished, the sheets are again pressed to render them flat and to improve the surface, the edges are trimmed and their manufacture is then complete. The sheets ordinarily measure 40 inches by 40 inches, while their thickness varies by thirty-seconds of an inch, from $\frac{1}{32}$ inch to $\frac{1}{4}$ inch. The millboard is cut into shapes suitable for the purposes for which it is intended; pipe-joints are made with rings, valve-chest joints with rectangular shaped washers, and other joints with appropriate forms. The value of the material lies in its indestructibility; it is a pure mineral substance, and suffers no change from contact with heat, steam, or grease, and exercises no chemical influence on the metal with which it lies in contact, so that when the joint is broken the surfaces are found to be uncorroded and to have suffered no change. A finer description of asbestos paper is made for electrical work, as it forms a very efficient non-conductor.

(To be Continued in our next issue.)

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Canadian Pacific Railway

Tenders for Engine Houses at North Bend and Port Moody.

SEALED TENDERS, addressed to the undersigned, and endorsed respectively: "Tender for Engine House at North Bend," and "Tender for Engine House at Port Moody," are invited from persons wishing to furnish and erect Engine Houses at these points on the Canadian Pacific Railway in British Columbia, and will be received at the office of the Secretary of the Department of Railways and Canals, until noon, on the 24th day of May, 1885.

Plans and specifications may be seen and forms of tender obtained at the office of the Chief Engineer of the Canadian Pacific Railway, Department of Railways and Canals, and in Victoria, Vancouver Island, at the office of the Dominion Government Agent, on and after the 1st of May.

Separate tenders must be made for each Engine House and be in separate sealed envelopes, addressed as above directed.

Each tender must be accompanied by a deposit equal to five per cent. of the amount of the tender. This deposit must consist of cash, or a bank cheque marked good by the bank, and it will be forfeited if the party tendering neglects or refuses to enter into a contract when called upon to do so, or if after entering into the contract he fails to complete the work satisfactorily according to the plan and specification.

If the tender be not accepted the deposit will be returned.

Tenders must be made on the printed forms supplied.

The Department will not be bound to accept the lowest or any tender.

A. F. IRADLEY,
Secretary,
Dept. Railway, & Canals.
Dept. of Railways & Canals.
Ottawa, 28th April, 1885.

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CANADIAN MINING REVIEW

VOL. 3.—No. 4.

1885—OTTAWA, JUNE—1885

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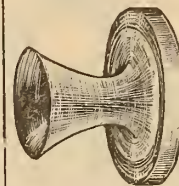
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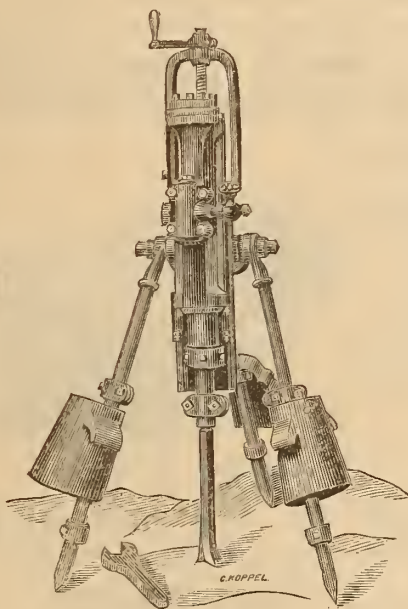
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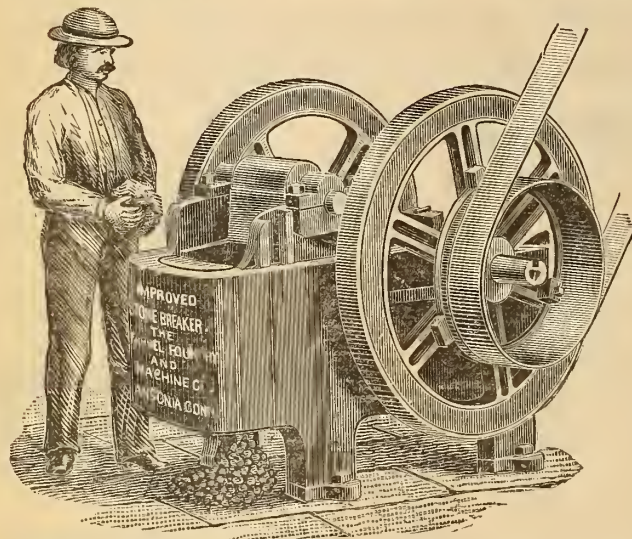
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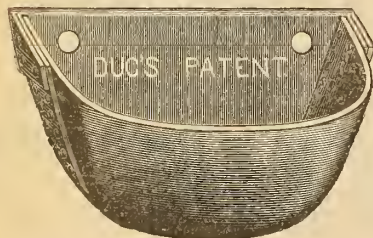
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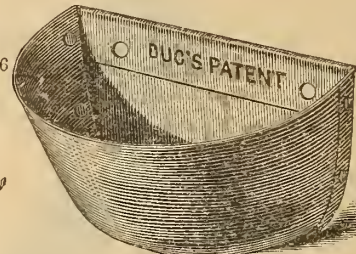
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The CANADIAN MINING REVIEW is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts as well as others interested in Canadian Mineral Lands are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 20th of the month.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

With the opening of the present season a marked interest is being manifested by the mining community at large in the developments that are now going on in the gold and silver regions on the north shore of Lake Superior. The mines that have for the past year been successfully operated, and other mining localities that have been taken up, and are now being prospected, are so accessible and so conveniently situated to the base of supplies, as compared with those of the far Western States and Territories, that the time has arrived when approved methods for permanent mining should be inaugurated. Until this has been done profitable development will be delayed. The manner in which mining operations are to be conducted in this new field will, in a great manner, be determined by the methods adopted by those who have been the first to engage in mining industries in the district. Not only should modern machinery be erected, but good judgment should be exercised in selecting such machinery as is most suitable to the ore on which it is to be employed. The employment of skilled and experienced workmen under proper and economical business management are cardinal features to be observed in all mining industries. Mistakes will occur, but they are to be corrected, not repeated. The Lake Superior district is among the most inviting mining centres of the Dominion, its mineral resources are varied, and its gold and silver ores are rich in these precious metals. The

value of the deposits having been assured, there should be a liberal and careful use of capital in developing them, and a prosperous future will be the result.

The Assistant Director of the Geological Survey of Canada, Dr. Robert Bell, sailed from Halifax on Wednesday, 27th May, on the *Alert*, in charge of the geological branch of the Hudson Bay Expedition. He will not return to Ottawa until late in the autumn.

Mr. William Pickford, London, England, President of the Phosphate of Lime Company, arrived in the city on 1st instant. Mr. Pickford had for some days previous been superintending the company's operations at its *High Rock* mine in Portland West.

Professor Edward J. Chapman, of the School of Natural Science, Toronto, paid us a visit a few days ago and expressed himself much gratified with the advancement in the mining industries of this district. Professor Chapman was in Ottawa attending the sessions of the Royal Society.

Mr. W. de L. Benedict, M.E., of the firm of Benedict & Cole, New York, paid us a visit last week. He was en route to New York, after having made a professional examination of the Fitzroy lead mine. Mr. Benedict has had much experience among the mineral deposits of Central Canada.

A special meeting of the shareholders of the Dominion Phosphate and Mining Company will be held at the office of the company, No. 8 Custom House Square, Montreal, on Tuesday, the 9th of June, proximo, at noon, for the purpose of considering, and if thought advisable, of increasing the capital stock of the company, or of authorizing the Directors to issue bonds of the company, as they may be required, for raising the means for contemplated increased operations, as authorized by the company's charter.

Many points of interest were touched upon by Professor Wm. Boyd Dawkins in the able address on the Canadian North-West which he delivered early in May before the Manchester Geographical Society. From his eminence as a geologist, most importance attaches to his remarks upon the undeveloped mineral wealth existing on the northern bank of the St. Lawrence. Gold, silver and copper, he believed, were to be found in this region in valuable quantities, and in his opinion these deposits could, ere long, be fully worked, and the country peopled by large numbers of Englishmen.

MINERALOGICAL SOCIETY.—The science lecture room of the College of Ottawa was filled on the evening of May 7th, the occasion being the last regular meeting of the Mineralogical Society. The work of the year could not have been better completed than by the essay of Alf. Lussier, on the "Formation of Mineral Veins." He introduced his subject in a very lucid manner,

exposed the various facts revealed by observation, and the many theories devised to explain them. The style contributed much to make the lecture interesting even to the most indifferent in the audience. A plan was afterwards devised for a scientific excursion to Buckingham, which has since taken place, on the 19th of last month.

The Hudson Bay Expedition, under command of Lt. Gordon, R.N., sailed from Halifax, N.S., on Wednesday, 27th May, on board the *Alert*. The expedition comprises five parties to be located at the stations which were established in the Straits last season. Dr. Bell, Assistant Director of the Geological Survey, has accompanied the expedition and will explore the geological and mineralogical features of the east coast of Hudson Bay, which are already known to be of interest and importance, and will return with the ship in the autumn. The *Alert* is particularly adapted to this class of navigation and was presented some years ago to the United States Government by the British Government to assist in the search for Greeley. She has recently been transferred by the United States to the Canadian authorities for service in the expedition in which she is now engaged.

The *Canadian Gazette*, London, England, in a recent number says: "Among the minor industries of the Dominion none has had a more rapid growth than phosphate mining. It is still in its infancy, but seems certainly to have a very satisfactory future before it. The deposits in the Ottawa district are of the chief importance, and some details of their development may be of interest. It is only a few years since the first mine was opened up: now, on the Lievre River alone, seven or eight are being worked. And whilst the export of phosphate in 1878 was only 3,700 tons, this year the total will be at least 24,000 tons. The introduction of improved machinery, as English, Canadian and United States capital has been attracted to the industry, has not only increased the output, but has also diminished the cost of production. Little doubt is felt as to the demand for phosphate keeping pace with any reasonable increase in the supply."

A very interesting article by Dr. Bell, Assistant Director of the Geological Survey, "on the mode of occurrence of Apatite in the Laurentian system in Ontario and Quebec," has appeared in a recent number of *The Engineering and Mining Journal*, N.Y. The article contains a vast amount of valuable information bearing on the apatite deposits in the phosphate belt, of which Dr. Bell says: "In the county of Ottawa is the most productive phosphate belt as yet known, running northerly and following the general course of the Rivière du Lièvre. It has been traced through the townships of Templeton and Buckingham, Portland, Bowman, Bigelow and Wells, and I have been credibly informed that the mineral has been found in places in this direction to a distance of 100 miles north of the Ottawa river. In the Perth and Kingston regions the phosphate belt runs from the township of North Elmsley, south-

ward through North Burgess, North Crosby, Bedford, Storrington, and into Loughborough."

His Excellency the Governor General with his Aides-de-Camp, accompanied by Dr. T. Sterry Hunt, of Montreal, and Dr. Grant, of Ottawa, visited the *High Rock* phosphate mine on Saturday, 30th May. The distinguished visitors were received by Mr. Pickford, of London, England, President of the Phosphate of Lime Company, and Mr. F. Hilton Greene, the company's Montreal agent. Flags were flying at the mine and in anticipation of the visitors' arrival some blasts were prepared and fired for their benefit. His Excellency and party were conveyed over the C. P. R. to Buckingham station and thence over the new branch line to the landing on the river, where they embarked in the steamer *Buckingham* owned by the Phosphate of Lime Company, and enjoyed a pleasant trip up the Du Lièvre, which has become noted to tourists for its picturesque scenery. The distinguished party returned to Ottawa the same evening much pleased with the day's excursion and greatly interested with what had been witnessed at the mines. The passenger car which conveyed His Excellency and party from Buckingham station to the village was the first that had been over the new branch.

Dr. Selwyn, Director of the Geological Survey, has completed arrangements for the distribution of his staff of surveyors and field geologists for this season. Fifteen parties will be engaged in exploring and surveying, and the field of operation will extend from the Atlantic to the Pacific oceans. It is expected that this season's work will supply much valuable information and will enable the Director to complete many of the geological maps that are at present in an unfinished and imperfect condition. The parties will be distributed as follows:—Two in British Columbia, in Vancouver and Cariboo districts, under Dr. Dawson and Mr. Bowman, respectively; one, under Mr. McConnell, on the east flank of the Rocky Mountains; one on the plains, between Calgary and Edmonton, under Mr. Tyrell; one party, under Mr. Lawson, in the Lake of the Woods district; another, under Mr. Ingall, on the north shore of Lake Superior, in the White Fish River silver region; Mr. Coste will have charge of a party in the gold and iron districts of the County of Hastings, Ontario; two parties will be engaged on the frontier of the Eastern Townships under Mr. Ellis and Mr. Adams, respectively; Mr. Lowe has already started out in charge of a party to continue the survey at Lake Mistassini; two parties are to survey in New Brunswick, one of which, under Mr. Chalmers, will work on superficial geology; and in Nova Scotia one party will be engaged in Pictou, Antigonish and Guysboro' counties, with Mr. Fletcher in charge. It is the intention of the Director to keep two parties employed during the summer in examining mines and collecting mineral specimens for the London exhibition, to

take place next year, and his entire arrangements for the present season's operations of his staff have been carefully and thoroughly systematized.

ROYAL SOCIETY.

The fourth annual meeting of this distinguished body opened on Tuesday, 26th May, in the Railway Committee room of the House of Commons. The President, Dr. T. Sterry Hunt, occupied the chair and called the meeting to order. His Excellency the Governor-General, Honorary President of the Society, was present at the opening. Dr. Hunt, in his opening address, alluded briefly to the history of the Society since its foundation and to the services of its founder the Marquis of Lorne. The vice-President, Dr. Daniel Wilson, next addressed the meeting, and was followed by Dr. Chauveau, one of the ex-Presidents of the Society. A vote of thanks to His Excellency for his attendance at the meeting, and his having consented to occupy the chair, was then moved by President T. Sterry Hunt, seconded by Vice-President Wilson, and carried unanimously amidst applause. In reply His Excellency delivered an eloquent and appropriate speech, touching briefly on the various subjects for study and research which should occupy the attention of members of the Society.

The Society held regular daily sittings, commencing at 10 o'clock in the morning, including Friday, 29th May, the last session, at which the election of officers for the ensuing year was proceeded with and resulted in the following gentlemen being elected:

President—Dr. Daniel Wilson, of Toronto.

Vice-President—Very Rev. Rector Hamel, of Laval University, Quebec.

Hon. Secretary—Mr. J. G. Bourinot, Clerk of the House of Commons.

Hon. Treasurer—Dr. J. A. Grant, of Ottawa.

The papers on geology and mineralogy read before the Society during the meeting was as follows:—

"On a new Mesozoic Flora discovered by Dr. G. M. Dawson in the Rocky Mountains," by Sir Wm. Dawson.

"Illustrations of the Fauna of the St. John Group (No. 3), by G. F. Matthew.

"On the Geology of Cornwallis or McNab's Island in Halifax Harbour," by Dr. D. Honeyman.

"Notes on the Economic Minerals of New Brunswick with revised list of mineral localities in the Province," by Prof. L. W. Bailey.

"On the Geology of South Eastern Quebec," by Thos. McFarlane, and "On the Geology of Thunder Cape, Lake Superior," by the same author.

"On the Wallbridge Hematite Mine, as illustrating the mode of occurrence of certain Ore Deposits," by Prof. E. J. Chapman.

"On the Fossil Plants of the Trias and Permian of Prince Edward Island, collected by Mr. Francis Bain," by Sir Wm. Dawson.

"On the Cambrian Rocks of the Rocky Mountains," by Dr. G. M. Dawson.

The full texts of the above papers will be published by the Society for presentation at its next annual meeting.

El Callao: The product of this famous Venezuelan gold mine, we notice, has been gradually falling off during the last five months. It amounted to but 7,640 ounces, or \$150,000, during March. The dividend was \$2 per share, or \$64,000, in the aggregate.

THE PHOSPHATE TRADE.

Since our last report of the phosphate industry of Ottawa county the ore has begun to move from the mines towards shipping point, and already a quantity has been forwarded to Montreal and some shipments have been made from that port to London and Liverpool. Since the ice left the Rivière du Lièvre steam tugs have been busily engaged in towing scows loaded with phosphate from the mines to Buckingham, and the Canadian Pacific Railway Company is carrying it thence to Montreal as rapidly as rolling stock can be provided and the unfinished condition of the Buckingham branch of the line will permit. This additional facility afforded to mine owners for the transportation of ore to point of shipment is a great improvement on former years, and although some delay has been occasioned, by the unusually late season, in ballasting the new branch line, it is well understood to be only temporary. The additional ore-crafts and tugs that have been put on the river since last season have been the means of reducing the cost of transportation to Buckingham fifty per cent., and the extension of the railway to that point has effected a still further reduction, so that the extreme cost of delivering phosphate from the most distant mines in the du Lièvre district does not now exceed \$2.15 per ton, including hauling from the mines to the respective landings on the river bank where the ore is put on the scows. This represents a saving of quite \$1.50 per ton as compared with the cost a year or two ago. The mines in the district were never more productive than they are to-day and the quality of the phosphate to go forward this season is of a higher grade than heretofore. As one year has succeeded another, so has it been one pleasant duty to record some improvement in the method of carrying on this important industry. The investment of foreign capital has done much to bring about changes that had been needed and to place phosphate mining on a more businesslike basis; but time and experience have shown where this capital was to be used to best advantage, and to-day we find that our phosphate industry has been almost thoroughly systematized so far as it extends on this side of the ocean. As to how the product of the mines can be most advantageously disposed of in the various markets abroad still remains an unsettled question and is a matter of too grave importance to be treated with indifference. It is admitted that under the existing system of purchase and sale a large margin of profit is returned to the mine owner, but under a better organized system his profits might be much increased. We have already offered suggestions on this point in the columns of the REVIEW, and we have learned that some contracts for this season's delivery have been made subject to conditions more favourable to the shipper. A satisfactory solution of this vexed question can only be arrived at by the concerted action of those who are most interested in the future of our phosphate industry.

phate mines, and until this has been achieved there will exist more or less dissatisfaction among shippers of ore.

THE MINES.

The present condition of the mines is most satisfactory and since our last report there have been many important developments. The force of men employed has not varied since the winter and mining is being proceeded with with the same activity and engery which has been noticeable for the past twelve months. Additional machinery has been erected at some of the mines during the past few weeks, and provision is being made for the transportation of ore to the river bank. In one instance it is in contemplation to construct a tramway, about $4\frac{1}{2}$ miles in length, to enable the owners of the property to forward ore more rapidly and at reduced cost. Such substantial improvements as these are only decided upon after the deposits have been found to be of a permanent character, and the developments of the past year have conclusively proved this to be the case at all the mines in operation in the district.

The *High Rock*, *Star Hill*, *North Star*, *Little Rapids*, *Emerald* and *Battle Lake* mines have more ore in sight at the present time than ever before and are yielding abundantly. In no individual case, however, have so important developments been made as at the *North Star*. Some months ago the owners of this mine decided to test the depth of the deposits on their property and instructed their superintendent to put down a shaft with this object in view. Starting on a narrow string of phosphate, not more than 3 or 4 inches in width, he proceeded to sink and, irrespective of mineral, has continued his downward course until a depth of 165 feet has been reached. At a depth of 30 feet the vein had increased to about two feet in width, and from this level it varied between one and four feet wide until it was nearly lost sight of at a depth of 80 feet. Continuing down, with the one object in view, more or less phosphate was met with and at 120 feet below the surface the vein was again intercepted, measuring about one foot wide, from which point it gradually increased in width, and at the present depth of 165 feet the shaft is penetrating a body of phosphate, the dimensions of which cannot be ascertained. On all sides of the shaft, which is 20x8 feet, and the entire floor, is solid phosphate. The ore is of a dark green shade and perfectly free from foreign matrix, as was shown but a few days ago when one blast removed nine tons of phosphate, every pound of which was placed on the ore heap without cleaning or cobbing. This, together with the developments at the *Little Rapids* mine at a depth of 180 feet on a true fissure vein, has exploded the theory that Canadian Apatite is only to be found in pockets near the surface.

Reports have reached us that some virgin properties have been successfully prospected since the snow disappeared and extensive deposits uncovered. A few undeveloped lots have changed hands since the beginning of the year and will be prospected this season. Mining will be engaged in during the pres-

ent summer by the *Glasgow Canadian Phosphates Company*, composed of Glasgow capitalists, who have acquired some property in Ottawa County, and we are informed of their intention to carry on extensive operations. We trust that good locations have been selected for this company and that the gentlemen whose money has been invested will realize the results which have been promised to them.

PHOSPHATE QUOTATIONS.

There has been little variation in the market abroad since our last report. Most recent advices from London and Liverpool quote one shilling for 75 per cent., with a fifth of a penny rise, and some contracts are reported at these figures. We are also informed of contracts having been made on Canadian weights and analyses, with moisture taken from weight, and this we consider to be the most desirable contract that shippers can make.

We are aware of one firm in England bidding for an annual contract for 10,000 tons of high grade. There is an expression of opinion abroad that the market will stiffen as the shipping season advances.

OCEAN FREIGHTS.

Tonnage has been freely offered since opening of navigation from Montreal to Liverpool and London at 3s. to 4s. 6d. per ton, and there is every indication that rates for this season will not rule higher than last year. This, together with the reduced cost of transportation from the mines to Montreal, will, to some extent, compensate phosphate shippers for the fall in the market value of the mineral.

The first phosphate shipment of the season from Montreal was made by Messrs. Wilson & Greene, Montreal, from *High Rock* mine, on 23rd May, on S. S. Oxenholme, to the Phosphate of Lime Company, London, England.

The first shipment of phosphate from Buckingham, over the new branch line of the Canadian Pacific Railway and thence, via main line, to Montreal, was made on the 22nd of May by the Ottawa Phosphate Company. The Phosphate of Lime Company, London, England, followed with the second shipment on the 23rd.

MOVEMENT OF FERTILIZERS FROM CHARLSTON, S.C.

	Tons, 1884.	Tons, 1885.
January	33,202	36,598
February	49,762	47,384
March	32,776	43,710
April	8,755	8,190
	124,495	135,882

Large deposits of tin ore have been discovered in Virginia; the veins are of great width and of richness. The United States is paying about \$30,000,000 yearly for foreign produced tin. Americans hope that this great outlay will be made in the purchase of American tin in the near future.

The Origin of Phosphatic Mineral Deposits.

The following notes by a gentleman engaged in the shipping of guano and phosphatic rock from one of the West Indian Islands will doubtless prove interesting and instructive to those who have been studying the Laurentian apatite deposits in our neighborhood. Our correspondent states:

"On every one of the deposits so far worked a central hard rock has been found of a very high grade which has always been worked down to the sea level, and in the case of Sombrero and Pedro Keys, but more particularly the former, it has been mined below the sea level, and at Sombrero it is now being worked by divers—a sea wall having been built—and is being blasted considerably below the level of sea. These rocks I claim to be an original geological deposit of the Silurian period of the same age as the Laurentian range of mountains of Canada, which contains the apatite, the singular flags of Wales and the fossilized marbles of New Brunswick. In every instance mica is found in the neighborhood. These old rocks have a small quantity of free phosphoric acid attracted to the limestone and coral formations which invariably remain in them after the said limestones and coral have parted with their carbonic acid gas by the action of fresh water, fresh air and vegetable causes, forming, as a matter of course, a firm tri-calcic phosphate.

As a positive proof that birds have nothing to do with this formation, I am now digging on land which has been in cultivation 100 years, have dug to the depth of 14 feet, swept the holes out with a broom, leaving exposed the whole limestone rock or matrix, and in three months after showers, and where birds never go, I can again gather a considerable crop of phosphate, so much so that I consider five years will now replace all that I have taken away. The growth is quite perceptible; but to quote one instance, the Pedro Keys were entirely worked out in 1856, were taken hold of again in 1862 and '63, and worked till 1867, again in 1872, and worked till 1875, again in 1878 and are still being worked. While I was there I had one piece of perfectly flat coral rock, about one eighth of a mile square, which I used to sweep once in four months and it gave me each time about 400 tons. This change was more rapid in the wet season than in the dry. It was on a part of the Key where no birds ever stayed, and on these grounds I have long since given up the idea that the bird deposit had anything to do with the present deposits in the West Indies. I consider all West India phosphate deposits come under two heads, the original geological deposit, as a Silurian strata, and the metamorphic rock, which has been changed in times past and is being changed now."

CANADA'S MICA MINES.

The increased demand for mica which sprung up some two years ago, and the advance in price, consequent thereto, did much to stimulate prospectors and explorers in their search for deposits of this mineral. The result of these explorations has been the discovery of mica deposits in various parts of North America, where its existence had not been previously known, and in no part of this continent have such valuable discoveries been made as in Canada. Though by no means numerous, the deposits that have been located in this country are extensive and of much importance, and the quality of the mica

has been pronounced by the best authorities of Europe and the United States as inferior to none that has ever been offered to mica dealers. Selected samples of East India, ruby and white, and New Hampshire and North Carolina mica have been forwarded to us for comparison with some that has been produced at a Canadian mine, and the result has been most favorable to the latter, after submitting samples of the five different specimens to the various tests by which the quality of mica is determined. In point of resistance to heat, cleavage and transparency, the Canadian samples stood the most crucial tests equally with any of those from the other localities above referred to, and much more satisfactorily than some. In fact the experiments to which it has been subjected have proved it to be of the very highest standard—and the crystals are of large sizes.

At the *Pike Lake* mine, in the township of N. Burgess, county of Lanark, a very excellent quality of white mica is being produced, and the sizes of the plates that are being shipped from this mine are considerably above the average of shipments from other mines.

In the township of Loughborough, county of Addington, there has been a large production of mica, of a dark amber shade, which appears to have found favour among certain dealers and stove manufacturers both in Canada and the United States.

The *Villeneuve* mine, situated in the township of Villeneuve, county of Ottawa, is, beyond any question, the most valuable and important mica property yet discovered in Canada. During the past eight months it has been undergoing development and is now a steady producer of the best Canadian mica we have seen. The samples that were tested for comparison with East India, North Carolina and New Hampshire mica, to which we have referred, were forwarded to us from this mine. Several tons of crystals of various sizes have already been taken from the tunnel and shaft, and a large number are now exposed, some of which are quite two feet square. Within the past few days we have received a number of plates, measuring 12x12 inches, of as beautiful mica as has ever been produced, which can at any time be seen at this office. This mine is destined to become a very heavy producer and is an exceedingly valuable property.

As stated in our last number, two important deposits of excellent white mica occur in the township of Miller, county of Frontenac, and in the township of Maison-Neuve, county of Berthier, respectively, on which, however, no development work of any consequence has yet been done.

BEAUCE MINES.

We have not been officially informed recently of what progress is being made in the Beauce gold fields. The latest report that has reached us bears date May 9th and gives an encouraging account of what has been done on the Gilbert River and on Slate Creek since the snow and frost disappeared. In the last mentioned locality some good work had been done at the *Allan & Humphrey* mine, and the shaft was penetrating rich ground a short distance, it was supposed, above bed-rock, but at the time our correspondent wrote washing had not begun. A fair quantity of coarse gold was being taken from the alluvial washing on the Gilbert, and the Canada Gold Company was continuing to prospect the quartz veins in Rigand-Vandrenil. In the parish of Linier exploration continues among the silver-bearing ridges and a vein, on which Mr. Torrance was working last autumn,

has been thoroughly prospected and its continuity for some miles has been established. Already a number of claims have been located along the bearing of the lead and rich ore has been taken out, samples of which we have seen. It is not unlikely that this season will witness considerable activity in the district and that several companies will be organized for permanent mining.

ASBESTOS MINING.

Towards the end of April work was resumed at the Asbestos mines of the Eastern Townships and has since been proceeded with vigorously. The *Johnson* and the *Boston Asbestos Packing* companies have put on an additional force of workmen and look for a corresponding increase to this season's output of their mines in Thetford over that of last year. Before mining was begun in the spring the entire output of the *Johnson* mine had been contracted for ahead, and we are informed that other mine owners have already disposed of all they can produce up to the close of the season, and at same prices as last year. This is attributed to a sudden demand having sprung up during the Anglo-Russian crisis, and it still continues. From the mines of Thetford, Coleraine, Broughton and Danville, it is expected that the shipments this season will exceed those of any former year, and as many undeveloped properties will be opened during the summer the Canadian Asbestos mines are destined to contribute largely towards supplying the world's demand in the future.

FITZROY LEAD MINE.

This mine has been actively worked during the past eighteen months and is now fairly developed. The mine is situated on an island formed by two branches of the Mississippi River at their junction with the river Ottawa, and about two miles from the village of Galetta, in the township of Fitzroy and county of Lanark, N.R. A shaft has been sunk on a vein of galena, in limestone formation, to a depth of 45 feet, and the continuity of the vein, which is about six feet wide, has been proved.

The vein matter yields from 15 to 20 p.c. of galena carrying about 3 oz. of silver to the ton. The mine is worked exclusively for lead and the ore is forwarded to Kingston for smelting. About 25 miners are employed and it is expected that a large amount of ore will be shipped during the present season.

IRON MINING.

With the exception of the *Coe Hill* mine, situated at the northern terminus of the Central Ontario Railway, and the *Bristol* mine in Pontiac county, there was little activity at the iron mines of central Canada during the past winter. At *Coe Hill* 75 miners have been employed since ore shipments ceased last autumn, whilst the *Bristol* mine gave employment to about 40 men. At both of these mines the force of miners is now greatly increased, nearly doubled, and during the present season of navigation it is to be expected that large shipments of ore will be made to the United States—that from *Coe Hill* to Cleveland, Ohio, via Ontario Central Railway to Weller's Bay, where the company has extensive docks and ore-pockets, and thence across Lake Ontario; and that from *Bristol* mine over the Canadian

Pacific and Kingston and Pembroke Railways to Kingston, from which point it will be forwarded to the company's works at Charlotte, New York State.

Other mines contiguous to the Ontario Central Railway will be actively worked during the present season, we are informed, and we hear of another property in Pontiac, not far distant from the *Bristol* mine, on which, in all probability, development will soon begin.

In the section of country now penetrated by the Kingston and Pembroke Railway large deposits of excellent magnetic and hematite ore abound, and with the facility for transportation now afforded by this railway, recently completed, there exists no reason why development work should not be proceeded with forthwith. The only reason we can think of why such a move has not already been reported to us is that the best properties have fallen into the hands of people who have not sufficient capital to develop them, or that they are being held by speculators. That these deposits could be profitably worked and would become important producers of iron ore there is no doubt; that they should be allowed to continue in their present undeveloped state is to be regretted.

Plymouth Consolidated Gold Mining Company.

We have on several occasions referred to the successful operations of this company at its mines in Amador county, California, and are indebted to the president, Mr. VanNorden, for a copy of the company's quarterly report, dated April 1st, which reached us immediately after the publication of our last number, on May 1st. It gives evidence of this company's continued prosperity and of the intelligence and economy with which its operations are conducted. The report reads as follows:

Gold Bullion produced January, 1885..	\$85,721 99
February, 1885..	80,974 87
March, 1885 ..	80,135 03
Total product for three months, 1885.	\$246,831 89
Operating expenses for same period..	81,930 90
Profit	\$164,900 99
Cash on hand, January 1st, 1885.....	74,295 06
Amount applicable to dividends.....	\$239,196 05
Paid dividends for quarter, Nos. 20, 21 and 22, \$50,000 each.....	\$150,000 00
Construction Account, three months ..	5,639 58
	\$135,639 58
Cash Surplus, April 1st, 1885.....	\$ 83,556 47

The cash on hand, \$83,556.47, is *actual surplus*, the company having no indebtedness whatever.

Since the annual report was issued, the main shaft has been sunk for a new level, No. 5. Drifting for the ore was commenced at a point 100 feet below No. 4. The ore will be reached early in May.

The tunnel running south on No. 2 level, is 766 feet long, measuring from the Pacific shaft.

The new Woolford shaft is down 233 feet, with a body of ore seven feet wide, milling about nine dollars per ton, including sulphurets. This vein is 600 feet east of the main mine, and is slowly improving as greater depth is reached.

The mother of the first child born in Eagle City, Arizona, received a present of \$5,000 in gold dust from enthusiastic miners of that region.

Burchard's special report on the output of United States mines during the year 1884, places the total amount of gold product at \$30,800,000 and the total of silver at \$48,800,000.

GOLD MINING IN INDIA.

The India gold mines created quite a "boom" in London some four or five years ago, and vast sums of money were invested in the wildest manner on mere "prospects." There was in fact not a single paying or developed mine in the gold district when the boom was at its height. It is almost needless to say that the "prospects" in very few instances only found any gold, and the crazy investments in worthless property and impossible mills were almost all lost. A year ago, a single company, the Mysore Gold Mining Company, was at work, for it alone had an unexpended balance of working capital of £13,000 (\$65,000), and since it had never paid any thing, there was every probability that it too would stop, and that India gold-fields would sink out of sight until the next mining craze in London. It appears that the Mysore Company has at last struck "pay," and has obtained 1,887 ounces of gold from 1,318 tons (2,240 pounds) of ore, or nearly 1½ ounces per ton. The cost of obtaining this is not stated, but the effect of its production is a sudden movement to reconstruct the moribund companies that have mines in India, and more capital is going into other properties on this slender basis. We hope the Mysore Company will make a great success; but if it should, it would be none the less true that the original investment in the India gold-fields, and even in the Mysore Company's undeveloped property, was of the wildest and most irrational kind, and the greater part—we hope not all—of it will naturally and inevitably be permanently lost.—*E. & M. Journal, N.Y.*

GOLD MINES OF AUSTRALIA.

The Victoria gold mines are in a prosperous condition, though no remarkable discoveries have been made during the past year. From the Mining Registrars' reports for the quarter ended December 31, 1884, we learn that the gold yield for the year 1884 was 778,618 oz. 7 dwt. 22 grs., or about \$15,572,367, counting the gold at \$20, or £4, per ounce. During the last quarter of the year, the yield was 200,788 oz. 16 dwt. 13 grs., say \$4,015,796, which was a considerable increase on the corresponding quarter of 1883. The registrars report the mining industry as prosperous, and that the production will probably increase during the coming year. Seventy-eight gold mines paid during the quarter \$1,132,895 in dividends, equal to about 28 per cent. of the entire production.

The mining population of Victoria is estimated at 28,430, of whom 12,988 miners were employed in quartz mining and 15,442 in alluvial mining. Of the total mining population, 5,369 were Chinese.

The value of all the machinery employed in the various mining operations in the gold field was estimated at £1,888,214, or \$9,441,070. A large number of diamond drills are now in use.

The three deepest shafts in the colony at the end of 1884 were, Magdala Company, 2,409 feet; Lausell's 150 mine, 2,041 feet; Victory & Pandora Company, 1,940 feet.

The Victoria gold fields appear to have a permanent future in quartz mining, for a vast number of reefs of low grade but paying ore have been found, and though the operations are in general on a small scale, they have, as above mentioned, been attended with profit.

The average yield of certain lots, amounting to 223,691 tons of quartz milled in the last three months of 1884, was 10 dwt. 5.96 grs., say \$10.30 per gross ton.

The Late Sir William Edmond Logan

In March number of THE REVIEW we published some reminiscences of this distinguished scientist, and we take much pleasure now in presenting to our readers a portrait of the great geologist, produced from a photograph taken in the year 1870, and which will be more readily recognized by his host of friends than those of him which have been published from photographs taken at a more recent date.

Sir William was born in the city of Montreal on the 20th April, 1798, was educated in Scotland, at the Edinburgh High School, and in 1817 he entered his uncle's counting-house in London, England. Dr. Harrington, in his "Life of Sir William," says: "For about ten years the great and busy metropolis was Logan's home, and it is to this period that we must look if we would obtain a view of many of his traits of character, which in later life only came to the surface at intervals. If, like his four brothers, he never married, and if for years he lived much in the seclusion of his study, or far away from the busy haunts of men, often with Indians as his sole companions, it was not from any want of appreciation of domestic comfort or happiness, not that to him society was devoid of charms. He was no misanthrope.



The Late SIR WILLIAM EDMOND LOGAN, Knight,
F. R. S., F. G. S., L. L. D.
(Born 20th April, 1798, died 22nd June, 1875.)

But as he advanced in life, the cause of science, which he had espoused, became more and more a ruling passion, and often masked his true nature and disposition." In 1831 he removed to Wales where he engaged in copper smelting at Morriston, near Swansea, and it was there he began the study of mineralogy and geology. In 1837 he was elected a Fellow of the Geological Society. In 1842 he was appointed to the position of Provincial Geologist of Canada and assumed the duties of office at Kingston in August of the same year. This appointment was the origin of the present Geological Survey of Canada. In 1851 Logan was elected Fellow of the Royal Society, in 1855 he was presented by the Emperor of France with the Cross of the Legion of Honour, and on the 29th January, 1856, was knighted by the Queen at Windsor. About this time he was awarded the Palladium or Wollaston medal—the greatest honour the Geological Society has to bestow.

From the day of his appointment to the office of Provincial Geologist, up to the time of his death, Sir William's life was one of untiring devotion to his labours in the field of science. He identified himself with the interests of his native country, and endeared himself to all who had come into personal contact with him. To testify their appreciation of the valuable services he rendered to Canada, his fellow-townsmen of

Montreal presented him, in 1856, with a testimonial in the shape of a massive silver fountain bearing the following inscription:

In commemoration of
His long and useful services as
PROVINCIAL GEOLOGIST IN CANADA,
and especially his valuable services in connection with the
EXHIBITION OF ALL NATIONS
in London in 1851, and in Paris in 1855, by which he not
only obtained higher
honour and more extended reputation, but largely
contributed in
making known the natural resources of his native country.
This Testimonial was
PRESENTED TO
SIR WILLIAM E. LOGAN, Knight, F.R.S., F.G.S., L.L.D.,
by many of the inhabitants of Montreal,
desirous of marking their respect and esteem for one
of the most distinguished of their
fellow-citizens.
Montreal, July, 1856.

Beset on all sides by difficulties and disadvantages Sir William continued to prosecute the work of the Survey with that zeal and energy which had ever characterized the man, and after serving the country for upwards of a quarter of a century his resignation was tendered to the Government in January, 1869. It was with feelings of deep regret that the public received the announcement of Sir William's retirement, and never was the press of any country more unanimous in its expressions of approval at the career of a public servant. After his retirement from active employment Sir William made frequent trips between Canada and Great Britain and in August, 1874, he sailed from Canada for the last time and went to visit his sister at Castle Malgwyn, Wales, where he died on 22nd June, 1875.

Logan was not only a Fellow of the Royal Society of London (1851), the Royal Society of Edinburgh (1861), and the geological societies of London and Edinburgh (1867), but also a member of the geological societies of France (1842) and Belgium (1874), of the Imperial Leopoldo Carolinian Academy of Germany (1857), the Philadelphia Academy of Natural Sciences (1846), the Marine Historical Society (1847), the Academy of Sciences of St. Louis (1857), the American Academy of Arts and Sciences, Boston (1859), the State Historical Societies of Wisconsin and Iowa (1859), the American Philosophical Society (1860), the Buffalo Society of Natural Sciences (1863), etc. He received the honorary degree of Doctor of Civil Law from the University of Lenoxxville in 1855, and that of Doctor of Laws from McGill University in 1856. He was also the recipient of more than twenty medals, awarded to him on various occasions as a recognition of his scientific work.

BRITISH COLUMBIA.

MINING NOTES.

Reports from Lorne Creek are encouraging. Fifty-seven miners are on the creek, and others are prospecting in the neighborhood.

An extensive discovery of silver has been made at Yam Creek, Northern Territory. There is ample wood and water on the ground for machinery.

Explorers and prospectors who have spent year after year in the province have discovered unmistakable indications of silver, all of which remain quite undeveloped.

Capt. McFarland and Mr. Caulfield arrived in Victoria on 7th May from the north, having come down for the purpose of procuring the requisite machinery for hydraulic mining.

There are reports to the effect that rich gold diggings are a certainty in the Kitsum-Kayhun country, and that white and Indian miners are making preparations to thoroughly work the new find.

Mr. McCullough, of Victoria, a short time since sent three specimens of silver ore from the interior to San Francisco for assay, and has received returns from two of the specimens assayed, \$28.27 and \$29.85 to the ton, respectively, and the third \$461.85 in silver.

Mr. H. B. Dart, of Boston Bar, has picked up a nugget of pure gold weighing about 6½ ounces. While walking over his ranche he noticed a piece of quartz slightly above the ground, and hammering out the rotten quartz he found a large irregular piece of gold, which now looks like a honeycomb with the quartz separated from it.

It is stated that two French gentlemen, M. Gérard and M. Péande St. Giles, will explore a portion of the Rocky mountains and the Selkirk range during the coming summer. They are on a mission of scientific enquiry, and will probably issue a report to the French Geographical Society on the mineral wealth of the province. After visiting Cariboo and the other mining centres they will descend the Fraser, examine the copper veins on the Semilkameen, and arrive in Victoria about July. They will then proceed to the coal district, and will also examine the iron deposits on the islands. M. Gérard is a mining engineer and it is to be hoped that his visit will result in the introduction of French capital into the province.

A large number of miners started north on 15th May for the mines on Lorne Creek, and those on the newly discovered creek in the same neighborhood, and the recent strike on Kitsum-Kayhun. Mr. J. S. Graaf, an old California miner, who spent the whole of last winter at the mines states that they are far richer than has been reported, and fully 2,000 men could go in and make good money. The late strikes would seem to fully endorse this statement, and probably such success will be met with this year that there will be a boom in the northern mines next season. They are easily and cheaply reached; supplies are also reasonable, and operations may be carried on during the greater part of the year, there being only five weeks of severe weather in December and January to contend against. The reports from the miners have been few, but all are favorable, and treble the number have already gone in this year. The prosperous days of the past may be repeated at the rich diggings that are being developed on the northern coast.

Mr. B. Bailey, in a letter to the *Colonist*, Victoria, says that the company of which he is a member, after prospecting for five years, has struck a well defined lode of silver ore sixteen feet in width and traceable by outcroppings 4,500 feet. So far as Mr. Bailey is able to judge from experimental results, he says that galena, gold and silver predominate. He adds that the lode is so extensive and rich that it will soon attract the attention of the world. The company is now running a tunnel and expects to strike the lode in three weeks. The locality is on Scott river, eight miles from Shuswap lake, in the mountains. A wagon road can be made from the steamboat landing to the road. Writing two days subsequently, Mr. Bailey says:—"We have broken through the outer crust and come upon a black seam of

ore some two feet in width which resembles oxide of silver. Above, or between the outer and lower seam, was a six-inch stratum of honeycombed quartz thickly coated with chloride. I am well convinced in my own mind of its worth; but will wait patiently for a test, and shall forward samples to California for assay."

On the 1st March, Messrs. Donohue, Roundy, and McArthur, with some half dozen other white miners, and ten Indians started on a prospecting tour. Following up the Sheeaxe river from the Naas to the lakes, they discovered two creeks, which they prospected with success. These creeks empty into Kitsum-Kayhun lake. Three weeks ago a long letter was received from the miners, stating they had good prospects—and would take up claims. The Indians came for a new supply of provisions, and brought some of the new gold with them; they returned and will take up claims. The white miners would not advise any great rush until they have further prospected the surrounding country. News will be given in a short time in regard to it. These creeks are easy to reach; the Indians walked out in two days—the white men call it 50 miles starting on a trail commencing 10 miles above tide water on the Naas, following the stream, and then crossing three lakes. Boats can be placed on these a distance of 17 miles, so that supplies can be freighted in. The men believe they have struck a rich country. It is reported 10 cents a pan is being panned out. It is near where Mr. W. Madden discovered gold lost fall.

LAKE SUPERIOR MINING NOTES.

As stated a month ago, arrangements have been made for starting three new mining and manufacturing companies. Two of them will begin operations this spring in the Rabbit Mountain district and one on the main shore at Port Arthur.

Parties who have recently come in from the Silver Mountain region are a unit in their opinion of the richness of that section. Several new discoveries have been made since the snow left the mountains which are reported to be of importance.

Capt. Wheeler has proceeded to the Zenith Zinc mine with a party of thirty miners, and a number of Indians to man the canoes and pack in supplies. Work was commenced at this mine last year and prospects were sufficiently encouraging to warrant these preparations for permanent mining.

Those who have been watching with interest the development of the Twin City mine are pleased to know that the result of the past year's work has so encouraged its owners that they have decided to erect and equip a stamp and concentrating mill, arrangements for which were expected to have been completed by the end of May.

The result of the winter's work at the Beaver mine is said to have been very encouraging, and satisfactory progress continues. The Superintendent boasts that the vein has never "gone back on him" since he opened it, and that it is a steady producer of silver ore. New roads are being made to the mine which will shorten the distance between it and Port Arthur.

Messrs. C. G. Kimball and John McGuire, of St. Paul, arrived in Port Arthur last month en

route to the silver region. The object of their visit was to inspect the mines in operation through the district, the owners of which are much gratified with the developments of the past six months and are anxious to have them examined by practical miners whose opinions would be of value.

At the Rabbit Mountain mine work has advanced through pay ore to the boundary line of the company's property. A shaft is also down as far as the engines now in use can take it, and pending the result of negotiations now in progress for the purchase of the adjoining property the company has decided to confine its operations to surface prospecting. If the purchase be made, new engines and a stamp mill will be erected without loss of time, the capacity of which will depend on the result of the negotiations referred to. The company has been collecting its smelting ore for shipment, a consignment of which will shortly go forward to New York.

The Huronian mine at Jack Fish Lake is unquestionably the most important and the richest gold location in the Lake Superior district. The vein on this property has been exposed for a distance of over 2,000 feet and measures from 4 to 12 feet in width. It is a true fissure vein of gold-bearing quartz in a gangue of talcose slate and has been thoroughly prospected. A shaft has been put down to a depth of 150 feet and drifting has been carried for about 100 feet, also on the vein. There is a ten stamp-mill, a steam hoist, saw mill and blacksmith's shop on the property, and their plant is quite inadequate to the capacity of the mine. Some of the ore has yielded as high as thousands of dollars to the ton, but the vein matter taken from the shaft and drift, all the way from the surface to the lowest point reached, has returned \$20 to the ton, and there can be no doubt a large percentage of the gold was not secured, owing to the imperfect machinery in use. Such a property as this should be in the hands of a strong company with ample capital to proceed with mining operations on an extensive scale, and to work to the best advantage. Under such conditions it would pay enormously.

Does mining pay? This question may to some extent be affirmatively answered by the fact that \$5,000,000 were received during 1884 as dividends by those engaged in gold mining in the colony of Victoria.

A MONSTER GOLD NUGGET.—A nugget of gold weighing 21 pounds (about \$5,000) has been found at the Berlin diggings, Victoria, and brought into Dunolly by two miners. The gold field was celebrated for nuggets some years since, and the present year will no doubt lead to the discovery of others.

Idaho mines produced nearly \$9,000,000 in gold and silver during 1884. The product for 1885 will exceed that amount. The mineral field in this territory is above 8,000,000 acres. This includes gold, silver, copper, iron, lead, antimony, mica, cinnabar, tin, soda, salt and other products.

The copper products of the United States were 30 per cent. more in 1884 than in 1883. The largest gain was in Montana, which territory produced 44,500,000 pounds against 24,000,000 in 1883. In Arizona the increase was 2,700,000, and in the Lake Superior country 8,800,000.

THE GREAT FOREIGN COPPER MINES.

The influence of the decline in the price of copper upon the profits of the small number of mines that control the market for this metal is a subject of great interest; for it shows approximately the limit of profitable price and the cost of production. This information concerning our great foreign rivals is still more interesting and important.

The following table we have condensed from the London *Mining World*, and have added the quotations of the shares of the companies at the beginning of the present month. Under the recent advance in Chili Bars, a corresponding advance has taken place in the shares:—

YEAR.	THARSIS.		RIO TINTO.		MASON & BARRY.		PANULICILLO.		Price of copper.	
	Dividend per cent.	Shares Par £2.	Dividend per cent.	Shares Par £2.	Dividend per cent.	Shares Par £10.	Dividend per cent.	Shares Par £4.	Chili Bars.	L.
1879	16½	21½	5	10	1	....	3½	5½	66½	53½
1880	20	34½	8	19½	....	....	9½	3½	73	56½
1881	25	48½	14	23½	....	....	10	4½	71	58½
1882	27½	45½	14	31½	15½	15½	15	5½	71	63½
1883	27½	71	14	25½	13	13	12½	7	64½	58
1884	20	5½	8	21	8	8	mill	5½	58	47½
May, 1885	....	4½	....	8	7½	7½	....	2	44	43

* Rio Tinto has also £2,500,000 of 5 per cent. mortgage bond.

last year was 3.23 per cent by wet assay; but the company expects to receive from 2¼ to 2½ per cent. on the 400,000 tons sold for the sulphur. This, at present prices, would amount to about 18s. per ton, and the sulphur is worth about as much more.

According to the president's report, the Rio Tinto expects to produce about 59,000,000 pounds of copper this year. Of this, 15,000 tons of 2,352 pounds will be produced by the company at the mines, and about 10,000 tons will come from the 400,000 tons of pyrites already contracted to acid-works.

We glean from the president's address that the cost of the 15,000 tons of copper produced at the company's works, delivered in London, will be about five and one half cents per pound. This, however, does not include "interest and sinking fund expenses for bonds," nor "expenses of administration." We may add to the list of companies cited above, the Cape Copper Company, which has 20,000 shares with £8 per share paid in, and which was quoted in London at the beginning of the present month at £30 to £31.

The Calumet & Hecla, with its capital of \$2,500,000, say £500,000 of capital, in \$25 shares, worth \$16 per share at the beginning of the month, holds its own well with its foreign rivals. This company expects to produce from 46,000,000 to 48,000,000 pounds of copper this year from a 4½ per cent. ore yield.

The great Anaconda, with its immense deposit of ore, which is yielding on an average say 10 per cent., and with its magnificent works, will probably produce 35,000,000 pounds of copper this year.—(*Engineering and Mining Journal*, N.Y.)

COPPER MARKET REPORT.

BY

S. RAUNHEIM,

224 Pearl Street, New York, May 14th.

The condition of the copper market since my last report has improved; in fact, more copper was sold to consumers in the last three weeks than during three months before.

The price of Lake copper is firm at 11½ cents: of other brands, about 10¾@11 cents, according to quality. At the same time, the price of Chili Bars has advanced in London from £43 to £45½, and a further advance would not be surprising, when the facts of the decrease of the American production become generally known, or should the manipulations of the European contractors for American copper and furnace material cease or be defeated by a counter move.

It is remarkable that a lot of Lake copper was sold in London at £55, two weeks ago, while Chili Bars were held at 43½, equal to a difference of £11½. This constitutes a handsome profit to the French syndicate, whose purchase price for May delivery is about £48. I am positively informed that the current price for Lake copper in Europe is £55½. Any returns of such copper from Europe to this country are hereby prevented. Furnace material at the disposal of our refineries remains scarce. The production of such material in Arizona is a very small one. Reports concerning the Copper Queen mine are not favourable. The Old Dominion Company has closed its works. This relieves the market of one million pounds copper annually—to be regretted in the interests of the shareholders. The Globe mine shows large reserves of ore, and, according to the statement at the last meeting of the shareholders, the copper laid

down here costs 6¼ cents per pound (of pig-copper), a profit of about \$25,000 a month.

The management in such hands as Professor Trippell and A. Harnicknell was an excellent one, and no doubt was entertained as to their ability to pay off the most pressing floating debt of the company during the next six months by actual profits made on the run of the furnaces. Unfortunately, the creditors, Pope, Cole & Co., of Baltimore, had to go into liquidation. The financial mismanagement of a former board weighs upon the present administration, chiefly composed of parties representing the Simpson estate at Boston, which owns \$568,000 mortgage on the Old Dominion Company's properties. Should the large shareholders be unwilling to render assistance, the mines may come under foreclosure and shareholders be frozen out. It would lead me too far to dwell on the reasons that have brought about such a result in a good mine. It is the old story: too much water in a mine may be overcome, though expensive to get out; but too much water in the stock is simply ruinous, even if applied to the best mine.

The Montana production during the first four months of this year, already fallen off three million pounds, will of course remain below the estimate; but, as principal mines run again in full blast, this year's production will come up certainly to last year's.

The same may be said about the Lake companies, the increased output of the Calumet & Hecla and others coming up to the falling off from the closing of several other Lake mines.

Exports from the United States to Europe during the first three months of 1885 were:

6,786 tons of ore and matte, valued officially at.....	\$ 831,000
5,410 tons of ingots and bar copper, valued officially at.....	1,257,000
Total.....	\$2,088,000

Corresponding to about nineteen million pounds of fine copper contents, or more than one half of our entire production. This statement confirms my latest reports, and proves our copper market to be in a very healthy condition.

New Copper-Manganese Alloy.

Engineering says: The French "Société d'Encouragement pour l'Industrie Nationale," at its meeting on December 26th, 1884, offered a prize of 1,000 francs for the discovery of a "new alloy useful in the arts." This prize has been awarded to M. P. Manhès, now so well known for his successful application of the Bessemer process in the metallurgy of copper, on account of his discovery of the value of an alloy of copper and manganese for improving the quality of commercial copper. It is stated that copper always contains more or less sub-oxide of copper irregularly disseminated throughout its mass, and that in consequence of this it loses some of its tenacity. M. Manhès prepares an alloy of 75 per cent. copper and 25 per cent. manganesc, and adds it in small quantities to the molten copper after refining, and just before casting, stirring the bath of metal at the same time. The manganese of the alloy is stated immediately to combine with the oxygen of the dissolved cuprous oxide, forming a manganiferous slag which is easily removed. The operation is cheap, and very much improves the quality of the copper so treated. Also several of the principal alloys of copper, bronze, gun-metal, and brass are of superior quality when prepared with copper purified in this manner. It is stated, too, that a series of experiments has proved that copper so treated

The decline in profits is not, however, to be counted as varying in direct proportion to the price of copper; for as prices decline, many economies are introduced and the cost of production per pound of copper declines. The production has been greatly increased by most of these companies, and a still heavier increase is promised.

The Rio Tinto is undoubtedly the greatest, though perhaps not the most important, factor in this question. The most important factor is the great company nearest the stopping limit.

This, the greatest mine in the world, is estimated, according to the president's address at a recent meeting of the stockholders, to have reserves of ore amounting to 150 million tons, and its dumps are stated to contain 46,000 tons of 2,352 pounds, or 108 million pounds of copper. This stands the company in £6 7s. 6d. per ton, or about one cent per pound. The cost of extraction by the company's lixiviation process is small, and it has already extracted 33,000 tons of copper from these dumps. It is not, of course, to be expected that the entire contents will be saved; but the process, though a slow one, extending over years, extracts finally a very high percentage of the metal, and at a low cost. The company mines about 5,000 tons of ore daily, and this year has contracted to supply 400,000 tons to the acid-works of England, France, Germany, etc., and will treat at the mines over one million tons.

The average copper contents of the ore mined

is much better suited for sheathing ships' bottoms than ordinary copper, as it is more slowly acted upon by the sea-water. On these grounds the committee of the society has awarded the prize to M. Manhès.

PRICES FOR MINING SOFT COAL.

Reports have been received by the *Coal Trade Journal*, N.Y., from a large number of mining localities throughout the United States, showing the prices paid for mining, the width of seams, size of screens, etc. As these reports are too voluminous to publish in full the *Iron Trade Review*, Cleveland, O., has constructed the following table of comparison showing the widest ranges in the several items referred to :

State.	Width of Seam. (feet.)		Price for Mining per ton.		Size of Screen.	
	Largest	Smallest	Highest	Lowest	Largest	Smallest
Alabama	3	2½	\$1.00	\$.62½	3	1
Colorado	9	...	1.12	.92	1½	...
Illinois	7	2½	1.29½	.37½	1½	...
Indiana	7	2½	.53½	.40	1½	...
Iowa	5½	4	1.00	.70½	1½	...
Kansas	3½	1½	1.85	.82½	1½	...
Kentucky	6½	4	.70½	.58½	1½	1½
Missouri	4½	1½	1.17½	.94	None.	None.
Ohio	5½	4	.55½	.46½	1½	1½
Pennsylvania	7	3½	.61	.35	2	1½
Tennessee	5	2	.70½	.30	1½	1½
Virginia	24	11	.94	.35	1½	1½
W. Virginia	14	3	.56	.40	...	...

These reports are not, of course, intended to be complete, as will be seen by the fact that the highest price reported from Ohio is put at 58½ cents per ton, whereas the present rate in some districts is 75 cents ; nevertheless they are of much interest to manufacturers and others and worthy of preservation. In several instances the price has been reduced from the bushel to the ton standard.

FAMOUS DIAMONDS.

The Amsterdam firm of J. Metz is busy with the erection of a special workshop, in which the cutting of the largest diamond of the world is shortly to begin. This diamond, which has recently been found in South Africa, weighs 475 carats, and is said to be greatly superior in color and brilliancy to all the other famous diamonds of the world, the largest of which, the "Grand Mogul," is in the possession of the Shah of Persia, weighing, after being cut, 280 carats. Next in size follows the "Orloff," of 195 carats, which adorns the point of the Emperor of Russia's scepter. The English "Kohinoor" originally weighed 116 carats, but in its present form is reduced to 102¾ carats. The "Regent," one of the French crown jewels, weighs 136⅞ carats. The time spent in cutting this last jewel was two years, during which time diamond powder to the value of £850 was used. The "Star of the South," which has been cut at Amsterdam, weighs 125⅞ carats.

In eight months ending November 30th, there were imported into India, in excess of all exports, gold bullion and coin amounting to \$20,396,980, or at the rate of about \$30,600,000 a year.

The power of Niagara Falls, exclusive of the velocity with which the water reaches the brink, is calculated to be 5,000,000-horse power, or nearly one-fourth of the whole steam power of the earth.

Asbestos, its Manufacture and Uses.

(Continued from page 11, Vol. 3, No. 3.)

So much for the first branch of the manufacture, which, although commercially very valuable, yields in interest to the second. Asbestos yarn may be worked up in a hundred different forms, serving as many different uses, while the paper appears to be chiefly serviceable for making joints, though it is now used also for making fire-proof partitions and for other building purposes. It may not be that we shall ever reach the time when our under-garments will be purified by fire instead of by the laundress' art ; but short of this, many uses now filled by materials the thorough cleansing of which can only be secured by their destruction may, possibly, be better served by asbestos.

We must now go back to the point in the process where the cleaning of the fiber ends. That description of raw material designed for the manufacture of yarn is discharged from the boiling-tanks into hydro-extractors. There all the free water is thrown out, and the drying is completed by steam heat. The fiber is then taken to a "shaking" machine, which separates the long fiber from the short, the latter being sent into the millboard department, and the former to the "carding" room. But its appearance is scarcely encouraging to one who has been accustomed to cotton or wool. These latter staples, examined under the microscope, exhibit a notched or serrated appearance, which explains the ready way the material clings together when twisted. But with asbestos, this structure is entirely wanting, and therefore the problem of twisting it into a thread presents special difficulties, which are rendered more evident when its behavior in the breakers and carding-engines is watched. Instead of leaving these in a sheet or "lap" it drops out in separate fragments, just as it entered, except that the fibers are combed out straight and laid side by side, parallel with each other. In spite of this, however, the carding is accomplished in several successive machines, each set to a finer gauge than the preceding. It is a difficult task to describe machinery of this class intelligibly, even with the help of engravings, to those who are totally unacquainted with it, and it would take more space than we have at disposal to describe the relative offices of card cylinders, lickers-in, and doffers. It is sufficient to say that the entire process is one long-continued brushing or combing, in which cylinders covered with teeth of gradually increasing fineness pass the fibers from one to another, continually drawing them out, until all knots and irregularities are eliminated and they lie straight and parallel.

The last machine is that known in the woolen trade as the condenser. Its final cylinder is covered with rings of card filleting with bare zones between them. The fibers are stripped from these rings by a reciprocating knife called a "fly-comb," and in the case of worsted are delivered in a number of parallel filmy tapes on to a travelling apron. Above this apron is a second, travelling in contact with it at the same speed, and having in addition to its forward motion a sideways or reciprocating motion. The tapes are fed forward between the two aprons and are at the same time rolled or "condensed" into threads. They are not spun, as there is no regular twist, but may be compared to threads of putty or dough rolled between the palms of the hands. The asbestos, as we have already explained, will not cling together upon mere contact, and consequently it leaves the last card cylinder as fragments rather than tapes. These fragments are neatly gathered into rows upon the apron by reciprocating scrapers, and are then

condensed as they proceed to the coiling cans. This is a part of the process that has required the most time and money to work out, and it was only after a long course of experiment that a carding and condensing apparatus was devised that was successful in producing satisfactory threads.

From this point, the manufacture of the yarn is simple. It is spun upon slubbing or roving-frames, such as are used in the cotton trade, except that no effort is made to draw it. These frames have a "positive take-up," and do not put any strain upon the yarn until it is twisted, when its tensile strength is very great, as the individual fibers are much stronger than those usually met with in spinning operations. The three remaining processes are doubling or twisting, braiding and weaving. In the first, a number of yarns are laid together, and are twisted into a cord or rope. This is generally used as the core of a braided packing, and is inclosed in a plaited cover by a machine of the usual construction, or the packing may be braided from the centre with fine threads. If a square packing be desired, in place of a round one, this is attained by the device of using four smaller cores around the central one. These extra cores are fed up through the heads around which the braiding spindles revolve in their mazy course, and are securely bound on to the middle core in such a way that the finished strand is of square section. One form of round packing is produced in a smallware loom, and is a specialty with the United Asbestos Company. It consists of a parallel or slightly twisted core, surrounded by an annular envelope of straight longitudinal warp threads bound together by a fine weft, which is drawn tight in the weaving and sinks into the soft centre, so that it is not exposed to wear until the covering is nearly destroyed. The result is an exceedingly elastic gland packing that has a fine bearing surface on the rod, and is capable of easy and rapid manufacture.

The asbestos cloth is woven in a loom exactly like calico, except that the reeds and healds are much coarser. The narrow cloth or tape is woven in a smallware loom. Both the sheeting and the tape are used for making joints, and the former is sometimes rubber-proofed to render it water-tight. The asbestos and India-rubber woven tape is so constructed that it can be bent around a corner without puckering, and thus is particularly useful in making joints in man-hole and mud-hole doors. If the cloth or tape be rubbed with plumbago or powdered asbestos before it is used, the joint may be broken and remade many times with the same packing. The cloth is also worked up into square gland packing by being cut into strips and built into a square rope with a backing of pure rubber to give additional elasticity. The edges of the strips lie in contact with the rod, and as the gland is screwed home, the compression of the rubber feeds the asbestos forward, so that a large proportion of the whole bulk can be actually worn away by the continual friction before new packing is required. It is scarcely necessary to detail the many other forms of gland packing that can be made, as it is evident that all the forms hitherto manufactured in cotton can be made with asbestos yarn.

The indestructibility of asbestos renders it serviceable for many miscellaneous purposes. It is used for filters and strainers both for domestic purposes and for chemical liquids. It is manufactured into drop-curtains for theaters, furnace-men's aprons and leggins, firemen's clothes and gloves, and ladders and ropes for fire-escapes. As a lining for deed-boxes, it serves to convert them into portable fire-proof safes ; and lastly,

it has attained a very great celebrity as the basis of a fire-resisting paint.

Throughout the whole of this article, we have spoken entirely of Italian asbestos. But there is a considerable trade in the Canadian material, which is lower in price. The hard and distinctly mineral structure of the American variety undergoes quite a different preliminary treatment from the softer silky texture of the Alpine product. The color of the cleaned Canadian fiber is a dead white, the staple is not long, and the peculiar greasy feel that we noticed above is absent."

On a Possible Genesis of the Canadian Apatite.

BY G. HENRY KINAHAN, M.R.I.A., &c.

(Read before the Geological Society of Manchester, February 3rd, 1885.)

In an inquiry of this nature it appears expedient to establish a known basis to which reference can be made; we will select the Irish Lower Palæozoic rocks, as with them our knowledge is more intimate than those of elsewhere, and at time compare phenomena observed in Canada with those studies among them.

From my brief explorations among the Canadian rocks, it appeared that the apatite rocks, but especially those rich in the mineral, were confined to a band or group of a limited width; this being made up of an association of various eruptive rocks both in beds and protrusions, calcareous rocks of different kinds, and schists; among the latter there being subordinate quartzites, while more generally they were micalytes, talcytes, chlorilytes, or such like. The eruptive rocks that specially belonged to the group seemed for the most part to be more or less basic; such as granitona, diabase, gabbro, and the varieties of euryte (*Daubuisson*), or the hybrid rocks of *Durocher*. There are, however, protruding into these rocks different granitic rocks, also rocks apparently much younger, such as the dyke in the leave line at the Emerald Mine, in the vale of the Du Lièvre.

Some poorer apatites occur in beds as apatitic schists: similar accumulations have elsewhere been called *drudge lodes*.* The rich accumulations, however, occur in true lodes having two walls, in lodes with one wall (half lodes), in bunches, lay and lay, and as string or small irregular veins.

The true lodes appear nearly invariably to have selvages at both walls, either a flucan (steatitic clay) or a steatitic schist, in part they have a comb structure, but more generally the apatite appears to fill the fissure; but having scattered through it minerals, the more conspicuous being stacks or crystals of blackish mica and veins of pyrrhotite.† In one lode was observed a vein of quartz (*cab*), which appeared to be more or less parallel to the walls, and associated with it were crystals of various minerals. Some lodes or portions of them, seemed to be typical "drudge lodes;" but at the same time there did not appear to be any "vein-stuff" that could be classified as a regular typical "gangue;" in some deposits, however, especially the bunches, limestone came in, more or less irregularly, the apatite graduating into lime-

stone; while in the latter were apatite crystals, some of great size, the largest known at the time (August, 1884,) being 800 lbs. weight, as exhibited at the office of the MINING REVIEW, Ottawa.

The half lodes may have either a foot or a hanging wall with a selva; near which the ore appears to be richest, the veins as it recedes from it becoming dradgy, and eventually merging into the country rock. It should be mentioned that the country rock outside the walls of both the true lodes and also the half lodes may be more or less apatitic. From the state of the working it cannot be satisfactorily seen whether the ore in the lodes occurs as *courses* or *shoots*, but it probably occurs in both ways.

Some of the bunches occur in connection with the lodes, they have accumulated in "vugs" that joined into the lode; others, however, seem to be independent accumulations. Of the latter some are in more or less regular masses, but others send off, or break up, into irregular branches or veins. The lay and lay, as with other minerals, occur as layers in the planes of the stratification or the structures; while the strings and small irregular veins are like those filled with other minerals. From the foregoing it will be seen the deposits of apatite are more or less like those of galena in some limestone districts; while they are also like some of the accumulations of limestone dolomite or allied rocks in the Lower Palæozoic rocks of Ireland, as will be presently mentioned.

The "back" or "gossan" of the apatite lodes is ferriferous; probably principally due to the decomposition of the pyrrhotite and mica; the "gossan-colour," however, has peculiarities of its own, being somewhat like that of a coppery gossan, but at the same time quite distinct. It is very hard to describe it in words, more especially as in my experience I have scarcely met two persons who see colours similarly. It is, however, like the — colour of the Irish; that is, a mixture of yellow and brown with a purplish tinge. As far as I could see, the "back" seems to be usually sandy, sometimes clayey in depth; becoming more purplish, due to it being mixed with apatite sand*: while on the back of a bunch the "broken" and "hard shelf" are stained more or less with the typical "gossan-colour." A good knowledge of the gossan-colour and the nature of the back seems to be of great importance to the explorers, as on account of the frailty of the mineral the backs of the lodes are of more or less depth; while many of the bunches seem not to come to the surface, and their position must be guessed at by the colouring of the broken and hard shelf.

That the archæan rocks of Canada are to be separated from other metamorphic rocks and are to be supposed to have accumulated in their present crystalline states, appears quite unnecessary, as they make and are similar to other metamorphic rocks of various ages. In that little bit of the earth called Ireland, are found rocks identical with the majority of these Canadian rocks; which can be demonstrated to belong to the Cambrian (*Primoidal*) Cambro-Silurians (*Ordovician*) and Silurians. Neither does it appear necessary to insist that lithological character, not even when they are also accompanied by a distinct break, constitute a petrological or stratigraphical boundary; as portions of the rocks of a group may be more altered than others, while a protrusion of

*The upper portion of the apatite lodes under the back, or what would be called in a copper or sulphur mine the "gossan lode," seemed to be a cemented or re-arranged purplish apatite sand, in which are irregular crystalline pieces of the green variety.

granite or any other exotic rocks, when altered along with those associated, will have a hard boundary, and probably will appear as if older, while in reality the original protrusion was younger than the rocks which it now underlies.

In the Croagh-Kinsheagh district, counties Wicklow and Wexford, Ireland, there are rocks that have been subjected to a more recent period of metamorphic action than any that invade the adjoining rocks, the results being that these rocks are now as much altered as many of the Canadian Archæan Rocks; yet petrologically they belong to the uppermost or youngest Cambro-Silurian strata—rocks which some few miles to the N.E. are unaltered. In Ireland we can also see the relations between metamorphosed protrusions and their associated sedimentary rocks; good examples being exposed in the Slieve Croob district, County Down, and the Castlebar district, County Mayo, where there were protrusions of granite that are now altered into gneiss, having had boundaries* between them and the associated metamorphosed sedimentary rocks. As already mentioned in the archæan gneissose rocks of the Ottawa county, there is a band or group of strata made up of schists, eruptive rocks and varieties of calcareous or allied rocks; in it the valuable accumulations of apatite have been found, and the well-marked characters of this group are more or less analogous to those of bands or groups in Irish lower palæozoic rocks. Of the latter the best marked group is the middle division (*Eruptive series*) of the Cambro-Silurian, as seen in south-east Ireland (Counties Waterford, Wexford and Wicklow). Here it consists of eruptive rocks in bedded masses and protrusions, tuffose rocks, calcareous and dolomitic rocks, argillites, micalytes, talcytes, with subordinate quartzites and metalliferous schists; such as pyritilites, graphityte and calcareo-ferriferous schists. The eruptive rocks are in a great measure similar to those in the vale of the Du Lièvre, Ottawa county, except that paramorphosis has more altered the latter.

(To be Continued.)

THE METAL MARKET.

Messrs. E. W. Carling & Co., of 16 Philpot Lane, London, England, report under recent date:—

A fair amount of business has been done in these commodities. Copper and Tin further advanced, more particularly the latter, but have since receded.

COPPER.—Chili bars, good ordinary brands, £44 12s. 6d to £45; Wallaroo and Burra Burra, nominal; English, tough, £48 to £49; best selected, £49 to £50; strong sheets, £56 per ton.

TIN.—Fine foreign, cash; straits, £83 17s. 6d. to £84 7s. 6d.; English ingots, £88.

TIN PLATES.—Charcoal, I C, 17s. to 20s.; coke I C, 13s. 6d. to 16s. per box.

LEAD.—Steady; English Ordinary Brands, £11 5s. to £10 17s. 6d.

SPELTER is easier, £13 10s. to £13 12s. 6d.

QUICK SILVER is dull; £5 12s. 6d. in first hands and £5 11s. 6d. in second hands.

IRON.—Scotch pig, 41s. 10½d. cash.

ANTIMONY—Regulus, £39 to £40.

YELLOW METAL.—Sheets, (4x4 ft.) 4½d. to 4¾d.; sheathing, 4¾d.

*This gneissic granite of County Mayo is more or less similar to the Labradorian or Norian gneiss of Eastern Quebec, and other Canadian localities. The protrusions, however, are mere specks in comparison, as some of the Canadian protrusions are larger than any of the Irish provinces, or perhaps of the whole of them.

*Coppery schists in West Cork have been called "drudge lodes." This Cornish term, however, I believe, ought correctly to be confined to a true lode, in which the mineral occurs as specks or spots irregularly in the vein-stuff.

†This has very much the appearance of nickeliferous pyrrhotite, but in the specimen brought home none was found.

McIntyre & Lewis,
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—AT—

ESQUIMALT, B. C.

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The Department will not be bound to accept the lowest or any tender.

By order,

A. GOBELL,

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Department of Public Works,
Ottawa, 23rd March, 1885.

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CANADIAN MINING REVIEW

VOL. 3.—No. 5.

1885—OTTAWA, JULY—1885

VOL. 3.—No. 5

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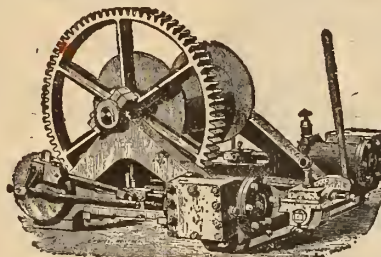
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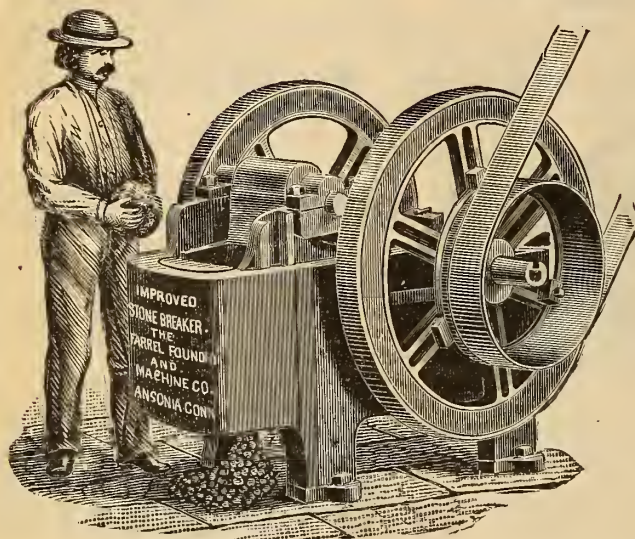
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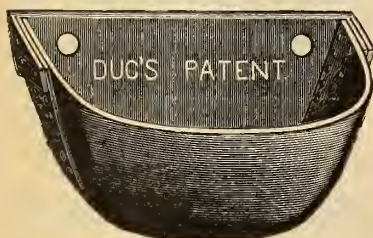
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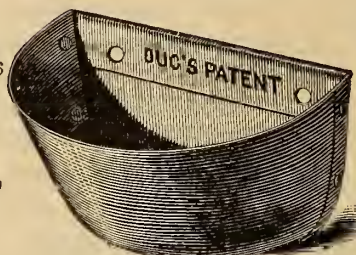
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Each tender must be accompanied by an accepted bank cheque for the sum of \$250,000, made payable to the order of the Honorable the Minister of Public Works, which will be forfeited if the party decline to enter a contract when called upon to do so, or if he fail to complete the work contracted for. If the tender be not accepted, the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

By order,

A. GOBEIL,

Secretary,

Department of Public Works,
Ottawa, 11th June, 1885.

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Wages, \$1.25 per day; regular board, \$3.00 per week.

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OTTAWA.

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The CANADIAN MINING REVIEW is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts as well as others interested in Canadian Mineral Lands are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 20th of the month.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

One of the most important features of the mining industry is the economical treatment of low grade ores. The history of mining, says the *Chicago Mining Review*, wherever prosecuted, shows unmistakably that the most satisfactory results and the most permanent basis, upon which a profitable and satisfactory business in this field has been established, is upon large bodies of ores, permanent and regular in their deposit, which have been rather under than over the average richness, although in most instances, where inexperienced men have been prominently active, the least valuable has been most eagerly sought, while the permanent and real basis of prosperity has been neglected.

The importance of a better method which shall open the wide field of low grade ores to profitable development, is exciting the attention of some of the best and most practical mining men of the age, and there is no doubt but the new inventions now under consideration, and being thoroughly tested by practical work, will show a large advance in this direction, indicating that in the near future hitherto valueless properties will be successfully and profitably worked and be converted into valuable dividend-paying mines.

The sudden death at Liverpool, England, on June 4th, of Mr. Furman Hunt, President of the Oxford Gold Mining Company, N. S., is announced. Mr. Hunt had been prominently connected, for many years

past, with Nova Scotian mining interests, which have lost in his death an able representative.

Dr. G. M. Dawson, of the Geological Survey, sailed June 25th from Victoria, B.C., on the schooner "Carolina," for the east coast. Comox and adjacent districts and islands will be thoroughly explored, and mapped geologically. Quatsino Sound will also be visited, and the coal measures and mineral deposits will be examined.

Messrs. Eugene Coste, and E. D. Ingall, have been appointed to the positions of Mining Geologists of the Geological Survey. This is quite a new department of the Survey recently created by the Director, and the selection of these two gentlemen to fill the positions has been judiciously made. Mr. Coste is a graduate of the School of Mines, Paris, is a Mining Engineer of marked ability, and has obtained much practical knowledge in the mining districts of England, Wales, France, Germany and Belgium. Mr. Ingall, graduate of the School of Mines, London, England, is thoroughly qualified for the position he now occupies, having had much practical experience in the mines in Great Britain, and for some years past, at the copper mines in Western Canada. Mr. Coste is at present operating in the Madoc district, and Mr. Ingall on the north shore of Lake Superior.

It is not improbable that the next meeting of the Institute of Mining Engineers will be held in Halifax, N. S., opening on the 15th September. The Province of Nova Scotia and the Dominion Government are making grants of money and offering free transportation over Government railways in order to insure the success of the meeting, which promises to bring many substantial benefits to the Province and to be one of unusual interest to the members of the Institute, whose Secretary will soon issue a preliminary circular on the subject, if such has not already been done.

Baron Grant, whose notorious career as a London financier (in connection with the Emma mine scandal) is feelingly remembered by many persons on both sides of the Atlantic, is the defendant in a law suit which is likeley to cause a sensation. The Baron recently undertook, on the behalf of a syndicate of capitalists, to investigate the merits of a gold mine in one of the Western States of America, which was offered for sale in London. The syndicate furnished the Baron with a liberal sum for expenses, and he sent a prospecting party to examine the mine. The prospectors returned with unfavorable reports of the mine, but they brought back \$9,000 worth of gold ore. The Baron advised the capitalists that the mine was a bad purchase, but he promptly converted the ore into cash, and it is alleged, pocketed the proceeds without making any report upon that

branch of the subject. The capitalists are now seeking for the value of the ore, with interest from the time it came into the Baron's possession.

The inhabitants of Port Arthur and the Thunder Bay district, petitioned the Ontario Government to subsidize a line of railway, to be known as the Thunder Bay Colonization Railway, the object of which is to open up a rich section of country and to afford transportation to and from the mines in the district. The petition, however, did not find favor with the Ontario Legislature, and a subsidy was refused. Mr. S. J. Dawson, member for Algoma, has since brought the matter forcibly before the authorities at Ottawa, and the Dominion Government, recognizing the importance of developing the rich mineral deposits of the Thunder Bay district, has instructed Mr. Wm. Murdoch, C.E., to make a survey of the proposed line of railway, with a view to satisfying the Government as to the feasibility of its construction. It is well known to the petitioners that a good location can be obtained, and a grant is, therefore, sure to be made.

The enterprising burglar was at work in the Geological Museum on the night of July 1st. Some one of the many strangers who visited the Museum on Dominion Day had cast longing eyes at the handsome collection of gold specimens, and during the night managed to obtain access to the room containing the mineral collection. By means of a fine saw the lock of the show case, in which the gold nuggets and bottles of gold dust present so enticing a picture, was removed, and the largest nugget made away with. This nugget, however, was nothing more than a fac-simile of the famous "Welcome" nugget found at Ballarat, Australia, moulded in plaster-Paris, and so well gilded as to deceive the unpracticed eye of the nocturnal visitor, who, by this time, no doubt realizes the truth of the adage, "all is not gold that glitters." The original "Welcome" nugget sold for £9,325 (about \$46,000) and the fac-simile in the Museum was labeled with its intrinsic value, and no doubt caught the covetous eye of its present disappointed possessor.

Thanks to the powerful means at the disposal of the mining engineer, ores formerly considered poor, and which are in fact very low grade ores, are often worked with large profits. The very extensive copper mines in the United States, on the south shore of Lake Superior, are brilliant instances of this; and in the colony of Victoria, Australia, a new country like ours, where labor is very high, ores yielding an average of five dwts. of gold per ton (say \$5.25) are esteemed rich, and others yielding only from two dwts. twelve grains to three dwts. (\$2.62 to \$3.15) per ton are sometimes worked to advantage.

The *Chicago Mining Review* says:—"The product of mining is indestructible and forms forever a factor of imperishable wealth, when added to the avenues of com-

merce and business. When its real value is understood, its true worth recognized and its development is undertaken in business-like and intelligent methods; when its requirements are studied, its demands met, when necessary conditions are secured, no industry known to men will produce more attractive features, more permanent qualities, or give better returns for the expenditure of capital and labor, than the development of the mineral resources of this country" (meaning the United States)—nor, we add, than the mineral resources of Canada.

The Calumet and Hecla Mining Company has declared a dividend of *seven dollars* a share, payable July 13th, and aggregating \$700,000. To our minds this present extra large dividend has the seeming of being very explicit proof that the suspension and reductions of dividends to which the management resorted last year was not justifiable nor made in the interest of the smaller shareholders, inasmuch as that suspension could but have the effect to make such holders to sell out their stock at the depreciated prices which immediately ensued. And the question arises: who bought the stock thus sold, upon which a dividend of seven dollars per share is now to be paid, in the face of a low copper market? (*F. & M. Record*).

The enormous profits that have been and are now being derived from the mining of low grade ores in the United States and Australia will give some idea of what can be done with the gold-bearing quartz veins of the Lake of the Woods and those on the north shore of Lake Superior. We are told, and statistics prove it to be true, that Australia ores yielding from \$3 to \$5 per ton are esteemed rich. In many of the mining districts of the United States \$6 per ton ore is worked at a large profit, and the Plymouth Consolidated Gold Mining Company, whose property is situated in Amador County, California, has worked its mines very extensively during the past two years at a profit of upwards of two hundred per cent., the ore yielding an average of not upwards of \$11 per ton. We are assured by very competent men, whose opinions have been borne out by careful tests, that the auriferous veins of the Lake of the Woods district have a mean value of over \$12 per ton, and the ore of the *Huronian* mine, to the southwest of Shebandowan Lake, has yielded an average of from \$18 to \$20 from a vein measuring from 5 to 12 feet in width. Surely this should be sufficient to encourage the owners of these properties to proceed to thoroughly develop them.

Mr. Coste, in his report to the Geological Survey, warns miners against the idea, so generally spread amongst them, that the richness of an auriferous quartz vein must naturally increase with depth, and states that, on the contrary, with depth a de-

crease in richness in gold in quartz veins was for a long time, by many, considered a law. Dr. Selwyn has, however, strongly refuted this theory, first in 1854, again in 1856, and in his "Notes on the Physical Geography, Geology and Mineralogy of Victoria, 1866," and now that the "Reefs" in Australia are explored to great depths, experience shows that he was right when saying: "That the extraction of gold from quartz reefs, if properly conducted, may be regarded as an occupation which will prove as permanently profitable in Victoria as tin and copper mining have been in Great Britain. It is a fact that gold quartz mining is more remunerative now in Victoria than ever, as shown by the statistics to be seen in the quarterly reports of the "Mining Surveyors and Registrars" of that colony. The following table from these statistics shows that if you take the two years 1876 and 1882, six years interval, the average yield in gold per ton is only less in two districts, is the same in two others, and is greater for the other three districts during the later period:—

1876.				DISTRICTS.	1882.			
Tons of Quartz crush'd	Average yield of gold per ton.				Tons of Quartz crush'd	Average yield of gold per ton.		
	oz	dwt	grs			oz	dwt	grs
315,407	0	6	14.16	Ballarat.....	466,754	0	6	14.41
95,639	0	11	6.61	Beechworth..	33,570	0	12	15.35
356,927	0	11	22.86	Sandhurst....	264,513	0	13	7.29
32,605	0	8	18.66	Maryborough	59,258	0	8	7.38
111,716	0	7	14.45	Castlemaine..	107,215	0	5	20.51
88,729	0	16	22.47	Ararat.....	67,784	0	6	6.88
49,784	1	3	12.58	Gippsland...	28,732	1	4	6.66

Another table, taken at random from these statistics, serves to illustrate how variable is the average of gold per ton in the "New Chum Reef," now being worked at great depths:—

Approximate Depth.	Tons of Quartz.	Average Yield of Gold per ton.		
		oz.	dwt.	grs.
At 460 feet.....	432	0	4	17.44
" 540 ".....	279	0	8	15.91
" 700 ".....	684	0	6	12.69
" 800 ".....	1,949	0	9	3.33
" 850 ".....	1,305	1	16	18.13
" 850 ".....	759	0	10	12.2
" 850 ".....	811	1	7	20.92
" 850 ".....	814	1	0	23.58
" 850 ".....	1,639	0	13	19.81
" 850 ".....	2,319	0	7	12.89
" 868 ".....	1,533	0	11	14.6
" 868 ".....	474	0	9	21.25
" 900 ".....	1,980	1	2	9.6
" 900 ".....	1,788	1	10	5.15
" 977 ".....	1,334	1	1	4.11
" 977 ".....	1,582	0	18	21.98
" 1026 ".....	2,285	0	11	7.61
" 1026 ".....	2,197	0	9	22.72
" 1026 ".....	2,999	0	9	21.42
" 1030 ".....	3,101	0	12	1.39
" 1106 ".....	410	0	13	15.74
" 1140 ".....	334	0	8	0.21

The average yield, it will be seen, changes all the time, vertically as well as horizontally; this is the "Bonanza" feature so well recognized everywhere for the other metals, and gold certainly must not be excepted; for this metal, as well as for the others, the decrease of the richness in depth cannot be made a law more than the increase. The gold quartz miner, in consequence, must bear in mind that the richness of his quartz is liable to change every foot, on the level or in the shaft, and he should always explore in advance the underground, keeping careful records of

the quartz crushed from the new levels and of the gold obtained; it is the only means at his disposal by which he may know whether his rock is paying or not. Assays of selected specimens, or a certain richness at one time will not teach him much, and will often induce him to incur unremunerative expense.

The Phosphate Trade.

A visit to the Rivière du Livère will give some idea of what is being done at the phosphate mines in that district. There are at present no less than four steamboats actively engaged in forwarding supplies to the mines and towing ore-scoops loaded with phosphate from the various landings on the river bank to the C.P.R. terminus at Buckingham village for transportation thence by rail to Montreal. In fact, so rapid has been the delivery of ore at this point that the railway company has had some difficulty in providing rolling stock to forward it. At the mines there is more phosphate being raised than ever before, and the force of miners is being increased as rapidly as provision can be made for their accommodation, and this in the face of a somewhat low market—low only by comparison with other seasons, for at present prices the margin of profit is greater than that attending almost any other mining industry. The outlook for an increased production is very bright, and the future of this important industry has never been so promising. During the month of June the output of four mines aggregated not less than 2,500 tons. During the last two or three months the mines have been visited by a number of mining engineers, geologists and practical miners, all of whom have expressed much surprise at the large bodies of ore which are in sight in the openings now being worked, and at the unmistakable indications of an almost inexhaustible supply of high grade mineral. The opinion, however, has been given by some of these practical mining engineers that the system which has been adopted of working the deposits is not such as will serve for permanent mining to the best advantage, and suggestions have been thrown out for important changes to be made in this direction. At many points the beds or veins are of a sufficiently well defined and permanent character to warrant the sinking of vertical shafts and drifting on the veins at different levels. Tunneling has also been proposed, where it is at all practicable, to tap the mineral at the lowest point possible, and by means of trams to thus avoid the expense and labor attending the hoisting of ore and refuse rock. The services of intelligent, practical mining engineers might be engaged to advantage at some of the phosphate mines where skilful mining would be an important factor in reducing the cost of production. The system in vogue at present at almost all of the mines is much akin to open quarrying, and it is argued by scientific miners that this is not the most economical method of raising the ore, as it entails the removal of an unne-

sary amount of rock, which is counted as dead-work. The nature of our phosphate deposits, however, is so different to that of any other mineral veins, and their character so irregular, that it requires practical experience and close and careful observation in the immediate vicinity of the mines to enable whoever may be conducting mining operations to determine how such deposits can be worked to the best advantage. During the past three years many important changes have been made. Steam power and machinery have been introduced; facilities for transportation have been greatly increased and the cost reduced almost, if not quite, fifty per cent.; more attention is given to cleaning the ore in order that it may go forward to the foreign market in a high state of purity; an increased demand for Canadian phosphate has been created; and the reputation of the mines is now firmly established. Having accomplished all this, mine owners can now turn their attention to studying the best methods at their disposal for permanent and economical mining, and with this end in view the suggestions and advice of practical men should, and certainly will, receive their earnest consideration.

THE MINES.

Proceeding up the Rivière du Lievre the first mine to be observed from the deck of the steamer is the famous *Emerald*. On the summit of a mountain, sloping to the river bank, can be seen the derricks, ore-bins filled with bright green phosphate and the waste dumps, indicating that a large force of miners are at work under ground. On a plateau, about mid-way between the mine and the river, is a cluster of neat and substantial buildings, including boarding houses, store houses, stables and the manager's office and dwelling. It presents the appearance of a small village, and is evidence of the profits which have been and still are accruing to the owners of this very valuable property. An excellent wagon road leads from the mine to the river, over which the ore is carried and placed in bins where it awaits transportation by scow to the railway at Buckingham. About seventy men are employed at this mine, and the output averages 500 tons per month. The convenient location renders the cost of transportation less from the *Emerald* than from any other mine in the district.

THE LITTLE RAPIDS MINE

is the next above the *Emerald*, about three miles further up the river, but, though only half a mile inland, is not visible from the steamer—in fact the *Emerald* is the only mine that can be seen from the river. The *Little Rapids* is situated on the crown of a mountain on Lot No. 6, in the 1st Range of Portland East, and is one of the best developed mines in the entire phosphate district. Three shafts, the deepest being 170 feet, and a large open cutting have proved the continuity of a true and well defined vein for several hundred feet. The vein varies in width at different levels, from 3 to 13 feet, and the mineral is of wonderful purity, quite free from pyrites and other objectionable matrix. The openings on this vein have exposed a body of mineral measuring upwards of 5,000 tons, which can be worked at a very small cost. Other veins have been prospected on the property, and are now being developed, and it would appear that wherever ground is broken bodies of phosphate

are encountered. All visitors to the district are attracted to this mine, and are much impressed with the singular regularity of the vein on which the most work has, as yet, been done. In this respect it differs from the other important mines, whose deposits are more *pockety* and variable. The machinery at the *Little Rapids* is well suited to the work it has to perform, and the buildings are of a substantial and commodious character. The ore that has been forwarded to the river bank presents an imposing sight on account of its pleasing pale green and uniform colour. Shipments from this mine will be of a very high grade.

THE NORTH STAR.

In our last edition we gave some particulars of the workings at this mine, and further developments have proved it to be a veritable "bonanza." The shaft is now at a depth of 190 feet in solid mineral, and from it 640 tons of high grade phosphate were raised during the month of June. The force employed at this mine does not exceed 50 men all told, a number of whom have been employed on the roadway between the mine and the river. An excellent road for a distance of 3½ miles has been completed, over which the ore is being hauled and delivered on the river bank. Everything connected with the *North Star* mine is now in perfect order and thoroughly systematized, which reflects much credit on Mr. W. H. Smith, the company's superintendent and business manager, when taken into consideration the many difficulties and disadvantages under which he has laboured.

STAR HILL MINE,

in Portland West, continues to be a heavy producer, having given an output of 650 tons for the month of June. This mine gives employment to 80 miners and workmen, and is substantially and suitably equipped. The road from the mine to the river is in good condition, and the teams engaged in hauling ore to the landing are averaging about two tons a trip. The company owns extensive territory, but only three deposits are at present being worked, one of which is said to be as large as any yet opened in the district.

HIGH ROCK.

At this mine preparations are being made to greatly increase the production. Additional machinery has been purchased, some of which is in course of erection, and the force of miners has been almost doubled during the past few weeks—at present it averages 160 men. *High Rock* has always been the heaviest producer of the Canadian phosphate mines. The output for June amounted to 710 gross tons, the largest yet attained in one month, and it is expected that with the increased force and additional machinery, the output for July will considerably exceed that of last month.

The Lievre River Phosphate Company and Messrs. McLaurin and Blackburn (Templeton) are also doing good work, and at present it would appear that the mines of Ottawa county will send forward an unusually large amount of phosphate during the present season—the low market notwithstanding.

PHOSPHATE QUOTATIONS.

The market abroad continues steady and the feeling points to better prices for autumn shipment. Latest advices report a half-penny a unit advance since the arrival of first shipments. The market is now firm at 1s. ½d. for 75 per cent. mineral with the usual one-fifth rise, ex-ship London and Liverpool. This is equivalent to \$19 per ton in Montreal, with freight at present rates.

OCEAN FREIGHT:

Freight per S.S. from Montreal to London and Liverpool has been freely offering at 5s. to 7s. 6d., and last month's shipments went forward at an average of not over 5s. per ton. Summer rates are not likely to rule high, and it is expected that autumn shipments will be carried at as low a figure as last year.

Phosphate Shipments from Montreal for the Season 1895, to Date.

Date.	Vessel.	Destin'tn	Shippers or Agents.	Tons.
May 21	S.S. Sarnia.....	Liverpool..	Lomer, Rohr & Co	108
" 23	S.S. Kehrwieler ..	Hamburg ..	"	500
" 23	S.S. Kehrwieler ..	Hamburg ..	"	200
" 27	S.S. Oxenholm...	Liverpool..	"	100
" 27	S.S. Oxenholm...	"	Wilson & Green..	485
June 1	S.S. Somerset...	Bristol....	"	142
" 3	S.S. Suffolk....	London....	"	148
" 3	S.S. Erl King....	"	Lomer, Rohr & Co	295
" 4	S.S. Landerdale ..	Barrow....	Millar & Co.....	160
" 5	S.S. Glenmorran..	London....	Lomer, Rohr & Co	85
" 9	S.S. Milanese....	Liverpool..	Irwin & Hooper..	265
" 9	"	"	Lomer, Rohr & Co	118
" 11	S.S. Wandraham ..	Hamburg..	"	590
" 10	S.S. Cranos....	Liverpool..	"	650
" 11	S.S. Mississippi..	"	Wilson & Green..	318
" 19	S.S. Dominion...	"	Lomer, Rohr & Co	322
" 24	S.S. Finsbury....	London....	"	544
" 26	S.S. Quebec.....	Liverpool..	"	120
" 26	"	"	Wilson & Green..	197
				5,347

Correction—The first shipment of phosphate from Montreal this season was made by Messrs. Lomer, Rohr & Co., on account of the Ottawa Phosphate Company, to Liverpool, on May 21st, and not by Messrs. Wilson & Greene as stated in our last edition. The above is a correct list of shipments to July 1st.

The Griffin Manufacturing Company, No. 92 Liberty street, New York, recently erected a mill at the phosphate works of Read & Co., Newton Creek, Long Island, N.Y. It is running steadily about one and one half tons an hour, sixty mesh, at a speed of 200 revolutions a minute. The dynamometer shows that it requires from 18½ to 19½ horse-power. Another mill has been ordered, and orders are expected for three more within thirty days. The trial has been entirely satisfactory.

VILLENEUVE MICA MINE.

This property may fairly be classed among Canada's most valuable mining locations, and of all the mica mines in the country there is none to compare with it, either in respect to its productiveness or the quality of the mica it produces. This mine is being carefully and systematically developed, and the micaceous vein on which it is located has already been proved to considerable depth and for a long distance. A drift is being run into the face of the mountain to tap the vein about 60 feet below the surface, and in doing this work a large amount of mica has been taken out. The end of the drift is now penetrating a body of feldspar and quartz thickly studded with mica crystals, and the further the drift is run the more numerous do these crystals become. During the past few months shipments have been made from the Villeneuve mine to France, Germany, England and the United States, and the mica has been pronounced by the dealers to be equal in quality to that which comes from the Ural Mines, East India, North Carolina and New Hampshire. The crystals in this mine appear to be well formed, and their average size is larger than those usually met with in other mica mines. The mica when cut into sizes and packed for shipping commands the highest market price, and the mine, when more developed, will be

capable of a large annual out-put. Samples have been forwarded to this office in plates measuring 12 x 12 inches, and have surprised many of our visitors, who had not been aware of the occurrence of so excellent a quality of mica in Canada.

Kingston Red Granite.

The owners of this valuable property, the "Canadian Granite Company (limited)," are making preparations to erect dressing sheds and polishing mills at the quarry, which is now well opened and in shape to produce stone in unlimited quantity. The granite, which is of a good medium sized grain in point of crystalline texture, is sound and uniform and of a beautiful rich flesh or salmon-red colour. The position of the quarry offers unusual facilities for working and for obtaining a reliable supply of labor. Vessels employed in the grain trade between Chicago and Kingston can carry the granite as return freight to the western cities, either in the rough or in finished blocks and paving stones. Dimension stone of almost any size can be taken from this quarry, and when the necessary machinery and mills have been put in position the company will be prepared to supply any demand. The stone commands a high price on account of its very pleasing color and the fine polish of which it is susceptible.

Dealers and workers in granite speak of it in the highest terms, and those to whom shipments have been made pronounce it equal to the red granite of Aberdeen and the Bay of Fundy. Already there is a large supply of paving blocks shaped and piled at the quarry, apparently of an extra good quality, owing to the free cleavage of the stone, of which the workmen say it enables them to earn better wages than they have been accustomed to earn at other granite quarries where they had been engaged on the same kind of work. These men, who are paid so much per hundred blocks, become very expert at their business, and the rapidity with which the blocks are turned out under their dexterous manipulation of the hammer, drill and chissel is interesting to witness.

A permanent roadway is being graded from the quarry to the Lake shore, a distance of about 200 yards, on which a tram will be laid to the Company's dock, and with water communication with the western cities during the summer months, and rail communication by Kingston and Pembroke, Canadian Pacific and Grand Trunk Railways at all seasons, it may be said that this quarry possesses advantages which places it in a perfectly independent position as regards shipping facilities. The Canadian Granite Company is composed of competent business men of ample means to place this enterprise on a sound and permanent basis, and the enterprising way in which they are endeavouring to establish so important an industry points to certain success. Nature has done much for the Kingston Red Granite Quarry. Means, intelligence and enterprise will turn it to account.

THE QUEBEC GOLD MINES.

Mr J. Fraser Torrance, Mining Engineer, formerly attached to the Geological Survey of Canada, is at present engaged in examining the gold and silver deposits in the Beauce district. Mr. Torrance has formed a very high opinion of the productiveness of the gold-bearing quartz veins of the district, and writes from Gilbert river, Beauce, as follows:

While so much capital is lying idle it is surprising that no attention is paid to this attractive field for investment. A recent writer very truly remarked. "The production of gold is decreasing and the amount required is constantly increasing. Gold mining is almost the only industry whose product is the more valuable the harder the times and the less it costs to produce. It is almost the only mineral product that never depreciates in value and that never overstocks the markets. The full significance of these facts should be carefully weighed by our Canadian capitalists who have suffered from the reckless multiplication of cotton and woollen mills, sugar refineries, etc., etc. They are well appreciated in California, where the commercial depression has induced unusual activity in opening new quartz mines.

Unfortunately our Quebec gold field, differing from California in this respect, has no golden records of past successes in quartz mining to encourage our capitalists in fresh enterprises. Almost all the capital invested therein has been devoted to alluvial mining upon the Chaudiere and its tributaries. Some of the companies were highly successful; others came to grief from a variety of causes, but rarely through a lack of gold. For many years all mines on the Gilbert were harassed by desulotry and expensive litigation as to the validity of the De Lery patent, which granted to that seignior that exclusive right to all gold within the bounds of his seignior. But this question has been finally disposed of by our courts upholding the rights of the De Lery Gold Mining Company as lessees of Mr. De Lery.

In A.D. 1864 this company was organized; and one of its first acts was to erect a quartz mill at Devil's Rapid on the Chaudiere. This was so faulty, however, in its construction, that the inexperienced manager failed to extract from the adjacent quartz veins enough gold to pay the working expenses. This led the company to speedily close the mill, although samples from more distant veins are claimed to have yielded from 15 dwts. to one ounce gold per ton. And from that day to this nothing has been done towards testing or developing the numerous large and promising quartz veins of this district beyond sinking a few shallow prospecting pits and selecting samples for assay. Some of these assays were so rich that the lucky owners asked enormous prices for their properties, while the titles were disputed. Their cupidity naturally over-reached itself.

Most people imagine that this Quebec gold field is confined to the valley of the Chaudiere. But the very profitable operations of the Hon. J. H. Pope in Dittan (about 70 miles to the south-west of Gilbert) extending over many years, and the enormous profits of the Rooks Mining Company in Vermont, confirm the statements of Sir William Logan as to its great area. Nothing has yet been done to trace and prospect it beyond Cranbourne in the opposite direction. But Sir William thought it probable that it would be ultimately traced as far as Gaspé.

Dr. Selwyn has done good service in pointing out the close geological resemblance of this region to the famous gold districts of Victoria, Australia, wherewith he should be very familiar. At the present day the placer mines of Victoria are declining in value; but the quartz mines are steadily increasing in number and productiveness. The same thing must occur here. Our miners on the Gilbert have constantly observed that their best *pay* was struck close to where the quartz veins crossed their channels or leads. The very natural inference was, that most of this gold (if not all of it) was derived from these quartz veins.

In Dakota, California and Victoria, the richest quartz mines of to-day are worked upon the site of exhausted placers. This is a good reason for believing that quartz mining is certain to become a permanent and profitable industry in this province. But there is very little use in any poor prospector attempting to test these quartz veins at his own expense. There is neither crushing-mill nor assayer in the district to test his samples for him.

The best way to undertake this work would be for men of means to employ an experienced engineer to search for such veins in accessible localities, bond them at moderate prices and properly test them. Quite a number could be tested in the course of the season at an outlay of two to three thousand dollars. Then a small portable mill of the best modern type might be erected beside the best of them, at a cost of five thousand dollars, and the work of development proceeded with. As soon as the regular mill runs had thoroughly established the value of the mine, capital could readily be found to develop it on any scale that the owners deemed advisable.

A cautious enterprise of this kind could hardly fail of success, *if conducted with the proper technical skill.*

THE MINES NORTH OF LAKE SUPERIOR.

Their Development Progressing with Satisfactory Results.

The mining region surrounding Port Arthur has been visited during the past few months by a vast number of practical miners, mining engineers and capitalists seeking investment, who have been a unit in pronouncing the district one possessing great mineral wealth. Prominently among the recent visitors was Mr. Charles F. Eschweiler, a stock holder in the famous Calumet and Hecla, who has had long and useful experience in the vicinity of that celebrated mine. This gentleman is eminently qualified to form an opinion of the value of mineral deposits and he has stated that this mining district deserves, more than any other on this continent, the fullest and closest attention, and added that he entertained not the slightest doubt that mining on the north shore of Lake Superior will prove as successful as anything that has yet been accomplished among the valuable iron ore and copper mines that have made the south shore famous.

The north shore district is certainly attracting a great deal of attention. Since the snow disappeared from the mountains and the ice from the lakes, no less than ten well organized and thoroughly equipped parties of prospectors have started out from Port Arthur and are distributed over the gold and silver regions, extending from the *Silver Mountain* and *Rabbit Mountain* mines to the *Huronian* mine on Jack Fish Lake. A large number of explorers are also out, and new discoveries are continually reported. This mineral district is very extensive and it will take years to thoroughly explore it. In the meantime it will be wise to develop some of the rich lodes that have already been located, and to proceed with active and properly systematized mining operations. With the assurance that has been given of the richness of the ore there is no need for *wild-cat* stock jobbing—rather the formation of strong companies to engage in honest mining under the direction of experienced and competent men, and success will follow. Ore is there in abundance, rich in gold and silver beyond the average ore of other districts where it is mined at enormous profit; sufficient development has been done on some of the locations to

eliminate the element of uncertainty, and capital should, therefore, be available for permanent mining. The practical miner, the capitalist and the public are not to be led astray nowadays by fabulous assays of picked specimens. What they require to know is the average yield of the vein matter before they can be induced to invest their money in a mining venture. To obtain this information a shaft should be sunk to a depth of at least one hundred and fifty feet on the vein and drifts run at different levels. When this has been accomplished and the ore proved by mill test to carry metal in paying quantity, it can be said there is a mine whose value has been practically demonstrated. Capital will then be forthcoming, and will seek investment in such property, and the mining industry of the district will thus be established.

THE RABBIT MOUNTAIN MINE

is owned chiefly by Americans, and is being worked under their direction. This mine has produced a large quantity of marvellously rich silver ore, and although we have not received very recent reports of progress we have been led to understand that the vein continues to show strength, and to yield good stamp-rock in large quantity.

THE SILVER MOUNTAIN MINE

awaits development, and although there are large bodies of ore rich in silver, little has yet been done towards opening them up. The proprietors are not showing much activity or enterprise themselves, and are holding the property at much too high a value for a perfectly undeveloped claim to expect capitalists to come to their assistance.

THE BEAVER MINE

may be classed among the working silver mines of the district and its owners are preparing for a largely increased production at reduced cost. The vein on which this mine is located is a well determined fissure and is highly spoken of by experts who have visited it.

THE TWIN CITY MINE

is capable of yielding silver ore in large quantity, and under careful management it could be very profitably produced. The whole vein-stone is good stamp-rock and the vein carries native silver in fair quantity. But of all the mines that are being worked on the north shore of Lake Superior the

HURONIAN MINE

is unquestionably the most attractive. Here there is a well defined fissure vein of gold-bearing quartz measuring from 5 to 12 feet in width, and extending for upwards of half a mile across the location. A shaft has been sunk on the vein to a depth of one hundred and fifty feet, and at the fifty foot level drifts have been run in opposite directions for about one hundred and fifty feet altogether, and some stoping has been done. The ore obtained is for the most part free-milling and has yielded gold averaging from \$18 to \$20 per ton. Dr. Selwyn, Director of the Geological Survey of Canada, and for seventeen years Director of the Geological Survey of Australia, one of the great gold-producing countries of the world, has pronounced the *Huronian* a good mine and one that will continue to be a steady producer for many years to come. Dr. Selwyn is acknowledged to be one of the ablest authorities of to-day on the origin and nature of gold veins, and, though naturally very reticent and cautious in expressing an opinion, he does not hesitate to do so with reference to the *Huronian* mine.

GOLD MINES OF THE LAKE OF THE WOODS.

So much has been said about these mines that the public would be led to suppose that important development had been made, but judging from the report of Mr. Eugène Coste, Mining Geologist of the Geological Survey, such is not the case; on the contrary, very little work has been done in the district and the so-called mines are still in an entirely primitive state, and so will they remain until they fall into the hands of practical mining men having sufficient capital to proceed with mining operations on an approved system and on an extensive scale. At all the mines in the Lake of the Woods district the openings may be described as mere prospect holes in the ground. The proprietors of the various locations have given more attention to furnishing the *press* with fabulous assays of the ore than to engaging in practical and honest mining. According to their reports the analyses of the vein matter never showed less than hundreds of dollars to the ton. Some of the veins in the district are undoubtedly auriferous, notably those of the "Pine Portage," the "Kewatin" and the "Winnipeg Consolidated" mines, and one of the veins of the "George Heenan Location"; but their richness is not exceptional, though sufficient to yield a handsome profit in the hands of strong companies and if worked efficiently. Serious mistakes have been made in the district, resulting in several cases in a suspension of work and abandonment of the property.

At the "Argyle" mine, for instance, the first thing to be observed is a splendid crushing-house for amalgamation and concentration, provided with ten powerful stamps and two fine concentrators; but you look in vain for the shaft, for none of the numerous holes in the ground are deserving of that name. The few thousand dollars expended in machinery on this property, before a mine had been located, would have been sufficient to have sunk a shaft at least three hundred feet in depth and to have run drifts at different levels. There would then have been a mine and the owners would have had the satisfaction of knowing its value; instead of which, after this premature outlay for a crushing-house, when there was no ore to crush, the company ran short of money and was forced to suspend its operations.

At "Pine Portage" mine a somewhat similar mistake has been made. The erection of crushing machinery should have been deferred, and when erected it should have been on the lake shore instead of on a creek which dries up every summer. At this mine, however, work has not been suspended. It is being slowly developed with rather encouraging results, and in the hands of a strong company would no doubt pay largely.

It would appear that the main object of the proprietors of the Lake of the Woods mining locations has been, from the outset, to sell their claims to capitalists at high figures, and with this in view have trusted more to sensational newspaper advertising than to the intrinsic value of their properties, which could only be established by systematic development. In this a great mistake has been made, for no one will be induced to pay a high price for property which has not been tested, and of which it is, therefore, impossible to know the value.

In short no serious work has yet been undertaken in this new gold district of the Lake of the Woods. The district is, nevertheless, one deserving attention; it is intersected by numerous auriferous veins, many of which are, without doubt, capable of being profitably worked by companies if their operations were properly

conducted, and especially if they were operating on a large scale. It is the impression of competent men, who have carefully examined the quartz veins of this district, that many of the lodes will prove to have a mean value of over \$12 per ton, which is the average richness of all the reefs until now worked in Victoria, and of which official statistics have been published.

BRITISH COLUMBIA.

Decrease in Gold and Large Increase in Coal.

REPORT OF MINISTER OF MINES.

The report of the Minister of Mines for the year ending 31st December, 1884, which has just now reached us, shows that there is still another decrease in the output of gold, the total being \$736,165, a decrease of over \$58,000 from that of 1883. The number of miners engaged has also lessened, being 1,858 in comparison with 1,965 of the previous year, while the average yearly earnings per man is \$396, a decrease of \$8, and the lowest since 1858.

The highest output of gold in any one year since was that of 1864, when the total amounted to \$3,735,850, with 4,400 miners, an average earning per man of \$849. In 1875 the output was \$2,474,904, with 2,024 miners, an average wages earned of \$1,222, the highest of any year in the mining operations of the province. Since 1875 the yield has steadily decreased. The total output of gold including the last six months of 1858 has been \$48,672,128.

The reports from the various gold commissioners of the districts are printed with the report, and furnish general and statistical information in reference to the operations for the year and progress or retrograde made.

CARIBOO.

In this district there has been a slight decline in the product and a decrease in the number of white miners, and a corresponding increase in Chinese. Little prospecting was done. The miners think that the government assistance would give more substantial results if a thoroughly reliable and competent quartz expert were to examine the ledges and give a practical opinion of their value; or else bonus a company who would test deep ground on promising enterprise.

Williams creek is referred to as being about played out, with the exception of a few hill claims.

Lower Antler creek is now mined exclusively by Chinese. The Nason company has made extensive preparations to push their claim, and good results were expected. Grouse creek was doing well.

The report states that "legislation would appear to be necessary in view of large claims being held by absentees on Lightning creek under a 'real estate' title, whereby the project of bringing up a bed rock drain is completely blocked."

The closing of the assay office at Barkerville is referred to as being a loss to the community, as it was discouraging quartz prospecting. The hope was held that it would again be opened.

The approximate yield of gold in the district, exclusive of Omineca, is \$423,855, of which Barkerville division contributed \$153,600; Lightning creek, \$78,000; Quessnelmouth, \$77,600; Keithley creek, \$89,595.

Little has been accomplished during the year in developing the various quartz mines.

The high prices of provisions had been a detriment to the progress of the country, many old Caribooites having left the district. This is accounted for by the high prices of provisions, caused by excessive charges of the railway line, the rates for freight having been higher than that of ox teams. The completion of the line was anxiously looked for, when an advance in progress was expected.

A prospecting party, who had been out eight weeks, returned without having struck any pay.

W. Stephenson's report from the Forks of the Quesnelle refers chiefly to the large number of Chinese miners, who evidently had been taking out good pay.

CASSIAR.

The report of Mr. J. L. Crimp, gold commissioner, is not very encouraging. The total output during the year was \$101,600, by 180 miners, whites and Chinese being equally divided. Dease, Thibert and McDame creeks were spoken of as being about worked out, though there were a few good hill claims on Thibert creek. McDame creek contributed the largest amount, \$53,600.

LILLOOET.

Mr. F. Sones' report of this district shows a large increase in mining operations over that of previous years, the output being \$107,934, an increase of \$39,592 over the previous year. A very large amount of the increase is due to the Bridge River mines, in which section the miners are nearly all white men. The mica discovery of James McKinlay is referred to, and the prospect that it would be developed if found without fracture below the frost.

The lack of enterprise in opening up the auriferous benches of the Fraser was referred to, and also on the Big Slide lode.

YALE AND LYTTON.

The gold mining operations in this district are confined principally to the Chinese working on the Fraser. The total output in Yale and Lytton divisions would be about \$15,000, with no new developments except the record of claims opposite the town of Yale.

KAMLOOPS.

There is nothing to report from this section, except that a prospecting party who had been out for a lengthy period met with poor results.

KOOTENAY.

Mr. Vowell's report gives the output of this district at \$60,826, the largest amount being from Wild Horse creek, \$36,730. These returns are considered satisfactory as compared with last year.

Prospecting for additional placer mines met with poor success owing to the constant high stage of water.

The developments of quartz were large, 49 claims being made at Kootenay Lake and 135 in the Kicking Horse region. The prospect was that the quartz mines would be extensively developed during the season of 1885. The necessity of an assay office for the district was referred to, on account of the rapid increase in quartz mining.

COAL MINING.

The report of the output of coal for the past year shows a total of 394,070 tons, an increase of 181,070 tons over that of 1883 from the various mines of the province. This gratifying circumstance is referred to as adding greatly to the general wealth of the province.

The principal market for the coal was that of California, to which point and various others 306,478 tons were exported. The local consumption

amounted to 87,488 tons, 20,000 tons more than that of the previous year. Of the 1,035,076 tons of coal imported into San Francisco, British Columbia contributed the largest amount, 291,546 tons, Australia being next with 190,497 tons.

The working of the various mines of the province are exhaustively referred to in the report and a great deal of statistical information given.

The number of miners engaged is 1,214, their wages averaging from \$2.50 to \$4 per day for whites, and \$1 to \$1.25 for Chinese. Of the latter 503 are employed. The value of the plant used in mining is \$700,000 for all the mines.

GOLDSTREAM QUARTZ DISCOVERY.

THE LEDGE STRUCK IN A CUTTING ON THE
ESQUIMAULT-NANAIMO RAILWAY,
BRITISH COLUMBIA.

Mr. Antonelli, contractor on the Goldstream section of the Esquimalt-Nanaimo railway, arrived in Victoria early in June, with fine specimens of gold-bearing quartz, from lodes discovered by the workmen. He says that four lodes have been exposed in a rock-cutting 20 feet in depth, one of which is six feet and another four feet wide; the width of the others had not been determined. Some of the specimens shown by Mr. Antonelli contain fine gold, visible to the naked eye, and in one of these is a nugget weighing about \$2. A quartz expert from Nevada pronounces the ore free-milling and similar to that which made Grass Valley, Cal., famous. Several Californian miners have visited the ground, and speak favorably of the lodes and the country rock. Several of the Railway employes have left the works to prospect the adjacent hills. A Chinaman picked up a large lump of gold in the cutting, and, fearing that it would be taken from him, packed up his blanket and started for town.

The value of the discovery cannot be determined until considerable work has been done on the ledge. A force of miners are at work on one of the seams, and the indications, so far, are that the lodes are very rich, though they may not be proved so by a more thorough examination and development.

Mr. Perry, C.E., employed on the Island Railway, reports that the ledge has been traced for over a mile in length, the surface outcroppings being from 3 to 5 feet in width. The quartz is rose-colored in appearance, with slight traces of free gold, and shows every indication of being rich. The lodes being outside of the railway belt are open to pre-emption under the mining laws. Two locations have already been taken up, one by Mr. Jos. Hunter, C.E., and others, named the *Triumph* ledge; the other by Messrs. Perry & Pinder, now known as the *Perry* ledge. Specimens from the *Triumph* have been forwarded to San Francisco for assay; others from the *Perry* ledge will soon follow. A large box of specimens has been deposited by Mr. Perry in the Island railway office.

A number of experienced prospectors have gone to the vicinity of the *strike*, and will thoroughly examine the district. There is ample capital available for development if, after a thorough test of the ledge, it is proved to be one that will pay. Experienced miners have expressed the opinion that it will, and if such should prove to be the case, the benefit to Victoria, and the Island generally, will be great.

At present the value of all the gold in the world is counted at \$6,000,000,000.

THE KOOTENAY CO.

Their Annual Meeting in Victoria, B.C.

The annual meeting of the Columbia and Kootenay Railway and Transportation Company was held on June 4th, when a mortgage of one and one half million dollars was authorized. The directors were authorized to sell to miners their claims for \$1,000 each, that being the amount required by the government to be expended on mining claims on government lands before crown grants are issued—the \$1,000 to be paid to the government and held for the use of the company on completion of the terms of charter. This action will give the miner a crown grant on payment of the \$1,000, and enable him to organize his company should he so desire, and proceed without delay in developing and working his mine. It was stated at the meeting that the provisions of the charter have been strictly complied with, and the projectors expect to take active steps during the coming year to construct the railway as contemplated by the charter.

Profitable Mining in Low Grade Ore.

English capitalists, says one of our *Exchanges*, have no objection to putting a few sovereigns in mining enterprises whenever convinced that they will get them out again with a fair prospect of a few more. Accordingly they are working mines in nearly all the Pacific States and Territories, and the operations at the two mines in California, owned by English companies, for the last half of the year 1882, are worthy of note. These are the Plumas Eureka and the Sierra Buttes. The first named produced 29,460 tons from its respective claims during that period. All this ore was reduced, besides 30 tons previously on the dumps. The ore yielded only \$6.60 in free gold, and yet it was worked at a profit, because the expense of mining, including prospecting, was only \$3.35, while the cost of milling was only 45c. per ton, making a total expense of \$3.80. The net balance for the half year was \$141,600, and out of this sum a dividend of \$70,313 was recommended. This has since been paid. The mine has given to its stockholders to date, the sum of \$1,730,800. The Sierra Buttes mine produced 15,769 tons ore during the same interval, all of which passed through the mill. This ore yielded \$7.48 per ton, or, including tailings, \$8.18. The working expenses were \$5.56, including \$4.98 for mining and prospecting, and 58c. for milling. Excluding the work on the eighth and ninth levels, the working expenses were \$4.15 per ton. The net balance for the half year was \$43,800, from which a dividend of \$30,625 was recommended. This has since been paid, and makes a total of \$1,460,300 given to stockholders to date. Here are two low grade mines that are being worked by English capital at a profit. We have in Canada numerous quartz claims of equal value, and some much richer in gold, that are now lying idle for the want of capital to develop them. Cannot English capital be employed in Canadian territory to as good advantage to the capitalist as it can in the United States? Those who are familiar with the nature of our mineral deposits, and their accessibility, say it can, and we will be pleased to see Englishmen investing more liberally in our mining industries.

One cubic inch of gold is worth \$210; one cubic foot, \$312,380, and one cubic yard, \$9,976,762 (counting the ounce at \$18).

THE MINNESOTA GOLD EXCITEMENT.

Mr. W. M. Curtis, M.E., in a letter to the *Engineering and Mining Journal* from Detroit, Mich., says:—

"The entire collapse of this North Sea's bubble has not surprised intelligent and honest assayers to whom samples of the "gold rock" were submitted.

Just where the blame rests is a little in doubt at present; but all circumstances seem to point to an accidental concurrence of a few amateur, dishonest, self-styled assayers, who gave high returns on any rock, simply to add a few dollars to their incomes, without knowing the similar rascality of the others, or suspecting the extent of the excitement that was to be raised.

The chief culprit in these false returns now claims simply carelessness and want of knowledge of assaying to account for giving, during the past six months, hundreds of dollars per ton to any gabbro boulder, the necessary pyrites giving him the clue for a gold return. The same rock at another time would run high in silver. One St. Paul expert, after giving 25 ounces of gold per ton, with the remark that it occurs as "chloride of gold" (in those old weather-beaten, moss-covered rocks of Lake Superior), calmly says he does not think it much of a country for gold either, but looks for large silver yield.

Besides the assaying, no one but the United States Land Office seems to have made anything. Some \$100,000 have been paid for worthless land, mostly rocks, bluffs and swamps, difficult to explore or reach, devoid of valuable timber or agricultural land. The fishing, however, is good. If it were not for the difference of the level of the lakes, it would be difficult to decide whether to call the country an archipelago of lakes or of islands.

On our trip, in canoe, from Vermilion lake to Grand Portage, we crossed 55 lakes and made 54 portages (32 miles portages), poled up six rapids, ran down many more, and yet did not go where the lakes were very plentiful, following mostly the United States boundary line of large lakes.

To the west of Emery's camp, the centre of the gold excitement, only the upper traps rise above the water, so that it is doubtful if anything will be found until the Vermilion Lake belt is reached. To the east, however, especially east of Gun Flint Lake, the Animikie or Canadian silver-bearing belt is very well developed, so that it is possible that rich silver deposits like those of Silver Islet, Rabbit and Silver Mountains may be found. A dense underbrush and a heavy covering of moss make exploration especially difficult. There is, without doubt, a fine belt of iron ore nearer Lake Superior. For beautiful scenery, fine fishing, and opportunity to study greenstone trap in all its forms, this country is unsurpassed.

It might be justice if the United States Geological Survey would devote part of the \$100,000 obtained for these lands to determine the construction and the continuation of the veins in this district."

By an explosion on the 20th June, in the Burley Pit, at Apedale, North Staffordshire, ten persons were killed.

During the past ten years Kimberley, South Africa, has exported diamonds valued by itself at forty million pounds sterling, and by the jewellers who deal in them at a hundred millions.

MINING NOTES.

NOVA SCOTIA.

The Rawdon gold mines show 161 ounces of gold for the month of May.

The Salmon River mine at Chezzetcook has resumed operations with promising results.

The amount of gold per man employed, as reported to the mine offices, has never been greater than at present.

The Gallagher mine, in the district of Stormont, shows returns of 499 ozs. 17 dwts. gold from crushing 197 tons of quartz.

Never in the history of gold mining in this Province has the volume of paying work done been greater than at the present time.

The operations of Messrs. Hall and Owen on their property at Leipsigate Lake are progressing favourably and the vein is being proved by judicious development.

The Spring Hill collieries in Nova Scotia are raising 1,500 tons of coal per day. In one day last month 1,693 gross tons were shipped by rail. This is the largest output yet attained by any colliery in Canada.

QUEBEC.

The asbestos mines of the Eastern Townships are yielding more abundantly this season than ever before, and there is more activity noticeable, especially at the mines in the townships of Thetford, Coleraine and Broughton.

At the Bristol iron mine in the County of Pontiac, owned by the Robert's Iron Company, of Charlotte, N.Y., mining operations are actively progressing. There is a fine quality of ore on three sides and in the bottom of the shaft, and ore is being raised at the rate of fifty tons a day.

The Capelton copper mines are yielding abundantly and are being worked at large profit, notably the mine owned by the Nichols Company, New York. The ore is shipped to the company's sulphuric acid works at Brooklyn, N.Y., and after the sulphur has been extracted the copper matte is sold, chiefly in Swansea.

The Forsyth iron mine in Hull Township, Ottawa County, is still idle. The shaft is filled with water and the machinery and buildings are going to ruin. This is one more instance of want of enterprise of Canadian mine owners. The proprietors of this property will neither work it themselves nor lease it to people who are ready to work it and pay a reasonable royalty on the ore extracted.

Gold mining in Beauce continues active, and the district has been visited during the past few months by many scientific mining engineers and practical miners, all of whom have expressed the opinion that the quartz ledges could be very profitably worked, and that under a proper system of mining the alluvial deposits would yield good *pay*—many of them are doing so although the methods employed are most primitive.

At the Haycock iron mine, in Ottawa county, is another monument to misspent capital in the shape of decaying buildings and machinery,

which were located and erected before a mine was established. It is unquestionably a valuable property, containing abundance of high grade ore, but is as yet not only quite undeveloped but it has not yet been even properly prospected, and, notwithstanding this, not less than \$125,000 has been uselessly expended on buildings, machinery and ill-advised mining.

ONTARIO.

Owing to the dullness in the iron trade none of the mines in Frontenac county are being worked at present.

Two more mines will be opened this season by the Central Ontario Railway Company, and the force of workmen employed at the Coe Hill mine will be much increased.

Two gentlemen of Pembroke are opening up a copper vein in the vicinity of North Bay which promises to develop well as the surface indications of the lode show considerable mineral strength.

The Central Ontario Railway Company commenced running ore-trains before the end of May, and ore has since been forwarded daily to Weller's Bay from the Coe Hill and other iron mines for shipment to Cleveland, Ohio.

It is not improbable that a change will very shortly take place in the management of the Canada Consolidated Gold Mine in the township of Marmora. Messrs. Stevens and Newberry, who have furnished the money to carry on the work under the present lease, are much dissatisfied with results, and it is to be hoped that the contemplated changes will be the means of placing this property on the list of dividend paying mines. The vein is capable of producing abundance of rich ore that would yield gold at a large profit if properly treated.

BRITISH COLUMBIA.

Early in June a strike was made on Finley creek, about ten miles from Kootenay lakes. Rumour says the miners make from \$5 to \$7 a day.

During the past winter in Cassair district one tunnel claim on McDame's creek produced a little gold, also one on Thibert creek, but the winter was so severe as to render it almost impossible to do anything.

A dry gulch near Lorne creek is being successfully worked by several parties. Water is being brought on the ground for washing. Parties who have been prospecting the various creeks adjacent to Lorne creek report having struck good *pay*.

The Yale silver mine, owned by Mr. Teague and others, will be developed in order to test its worth and extent. Ore assaying \$75 to the ton has already been taken out and if the mine gives promise of continued richness, it will be extensively worked.

Information has been received that the silver discovery on Shuswap lake is likely to prove of some importance. It is said that the lode is sixty feet in width and that seams containing gold and silver have been found, the outcroppings of which assay from \$40 to \$80 per ton.

In Cariboo district the Big Bonanza claim, on Lightning creek, through which the water broke, is again being worked with increased vigor, and

at William's creek good *pay* is being taken out. Bridge river miners report that they are doing very well, as also those on Kithley creek, north of the 150 mile post.

The Marquis of Lorne Co., on Dease creek, has found a hill channel which prospects from \$1 to \$20 to the pan. The company is making preparations to begin washing at once. This company has been prospecting for the past three years in the Cassair district and this is the first encouragement it has met with.

News from the miners on Lorne creek is satisfactory. A nugget weighing 104 dollars, the largest yet found on the creek, has been taken from the original Young American claim where a wing dam has been constructed. All the miners are busily engaged in making preparations to take out gold, building flumes, etc. Some Chinese miners have been driven from the creek.

R. E. Sproule shot and killed Thomas Ham-mill on the 3rd June while the latter was at work on the *Blue Hill* claim at Lake Kootenay. The murderer fled to the mountains after committing the crime and has since been captured. Sproule was looked upon as a dangerous man, having had a real or fancied grievance against the Ainsworth Company for invasion of his rights as a discoverer.

Mr. George Seymour and four men have been constantly engaged for the past nine or ten months in prospecting for coal for the West Vancouver Coal Company on Quatsino Sound. In the borings they have struck seams 3 and 4 feet thick, but none that would pay to work. Prospecting will, however, be continued as they are confident the search will be ultimately successful.

UNITED STATES

Ice was two feet thick at the bottom of some of the marble quarries in West Rutland, Vt., May 23.

A marl pit which abounds in petrified remains of animals has been discovered near Cuthbert, Ga.

A gigantic crystal of spondumene found in Dakota measures, according to Prof. Blake, thirty-six feet in length and from one to three feet in thickness.

Plymouth Consolidated Gold Mining Company, of California, has declared a dividend (No. 26) of \$50,000, or 40 cents a share, payable July 9. Total dividends \$1,300,000.

During the first five months of this year the output of the Calumet and Hecla is said to have been 23,440,000 pounds of copper, against 21,660,000 pounds for the same time in 1884.

A nugget of gold taken from the Cœur d'Alene mines recently was nearly four inches long, two and a half wide, and one inch thick. It weighed nineteen ounces, thirteen pennyweights and eight grains.

A stone found near Wildwood and Sumpter-ville, Fla., recently, is said to be on one side an exact imitation of a lamb's head, while the other side resembles the head of a seal. The shape of the neck, head and nose is almost perfect.

The first shipment of red slate ever made to Europe was sent from North Granville, N. Y.,

in May last. It is a fact not generally known, that the only red slate in the world is found in four towns of Washington County, New York State.

A ledge of white stone, which somewhat resembles marble, and is susceptible of a high polish, exists in Paradise Valley, Nevada. When quarried, it is said to be much lighter and softer than ordinary rock, but hardens upon exposure.

The 19th of June was a great day for Alaska, the occasion being the starting of the large quartz mill on Douglas Island. The mill began operation that day and all the stamps, 120 in number, started at one time, and is now running in full blast and works beautifully. There is great rejoicing among all the miners over the great success. There was a salute fired of 120 guns in honour of the occasion.

The *Copper Queen* mine in Arizona has been sold to an English organization, and a statutory meeting of the company, now known as the Copper Queen United, was held on the 8th June at the Guild Hall Tavern. No business was transacted at the meeting because of awaiting developments in a law suit, commenced by vendors of the property against the promoters, and consequently no payments have as yet been made nor the title passed.

Gold in Manitoba.

A correspondent at Shellmouth, Marquette District, Man., says:—

"Our town may now be described as an Eldorado in the North-West. Gold has been discovered in very considerable quantities on the bank of the river. It has also been found in the cellars of the houses, in the wells; everywhere is gold. Indeed, it is a veritable 'Tom Fiddler's ground.' In its present crude state an ounce or more may be easily washed out in a week, worth \$16 to \$18. Each day you may see men sitting along the bank washing out gravel in frying-pans or other vessels. Our real estate agent has written to the Government for instructions as to claims, and we are awaiting the advent of seekers after the precious metal."

New Caledonia Mineral Production.

New Caledonia is in minerals the richest of the French colonies. In 1883 it produced 9,025 tons of nickel ore, which yielded about 824 tons of nickel, worth 6,592,000 francs, or 8,000 francs (\$1,600) per metric ton. The production of chromium amounted to 3,850 tons. French Guinea in 1882 produced 1,558 kilogs of gold, worth about five million francs (\$1,000,000).

Mining Stocks as Investments.

Again we would call the attention of our readers and of their friends to the undeniable fact that mining stocks—so generally abused for some time and even derided in business circles here in New York—are comparing more than favorably, as investments, with railroad stocks and bonds. That is to say, any comparison of market results to investors will be found altogether and markedly on the side of mining securities. This fact we would specially call to the attention of the financial editors of certain of our secular contemporaries that have perversely gone out of the way to belittle mining stock investments, with the superficiality of information habitual to the *daily press*.

The experience of those who may have bought mining shares about the first of the present year and held them, will attest that within a month nearly every mining stock on the official list here in New York, and at San Francisco, has advanced from five to several hundred per cent. At the same time there is not one railroad security that has advanced as much as five per cent. A few names will tell the story so that he who runs may read it clearly:—

On the 9th of May, for example, the Consolidated California and Virginia was selling at \$1.55 and the first of the year at thirty cents, while to-day it is fetching from \$3 to \$3.20 per share.

The Eureka Consolidated at the first of the year was selling at not more than \$1.25 per share and \$7.25 thirty days ago, while at the present writing it is quoted at \$8.

The Homestake on the 2nd of January sold at \$10 per share, thirty days ago at \$11.87, while it is now quoted at \$14.12.

The Ontario, at the opening of 1885, was selling at \$18.25—a month ago sales were made at \$21.37; now it cannot be bought under \$25 a share. The Standard at the opening of the year was selling at 54 cents; a month ago it fetched \$1.30 and now \$1.60 is the quotation. Hale and Norcross was selling five months ago at \$4, a month ago at \$6.75, and at present at \$8.75. But to make the matter plain to the dullest understanding, we ask attention to the following showing of the market for all the Comstock shares at three dates of the present year:—

	Jan. 1.	May 11.	June 10.
Alta.....	05	30	90
Belcher.....	60	1 25	1 37½
Best and Belcher....	1 12½	2 87½	3 75
Chollar.....	1 87½	2 37½	2 62½
Crown Point.....	1 90	1 62½	1 75
Gould & Curry.....	1 00	1 75	2 37½
Mexican.....	50	1 12½	1 75
Ophir.....	50	1 50	2 25
Potosi.....	65	90	1 00
Savage.....	1 62½	3 75	4 75
Sierra Nevada.....	65	1 37½	2 00
Union Con.....	60	1 00	2 00
Utah.....	15	2 12½	3 12½
Yellow Jacket....	1 62	3 00	3 12½

Many other mining stocks have appreciated in like fashion, as for example, the Grand Prize, the Bulwer, the Iron Silver, etc., and very few have depreciated, such as the Horn Silver, Bassick and Navajo.—*Financial and Mining Record*.

A NEW PROCESS.

London *Engineering* informs us that Mr. P. Manhes has taken out patents for a process by which he claims to extract gold and silver from copper mattes. The mattes are roasted, after grinding, with from one to three per cent. of ammonium chloride, in a muffle-furnace. The heat is to be kept so low that the matte does not get red-hot, but all the ammonium chloride must be driven out. After this, the matte is not altered in appearance, but all the gold and silver are present in the form of chlorides, while the iron and copper remain as sulphides. The chlorides of the precious metals are then to be extracted by one or other of the well known solvents, sodium hyposulphite being specially recommended.

The El Callao, the famous Venezuelan gold mine produced \$175,500 during the month of April, and paid the shareholders a dividend of \$2.50 per share, aggregating \$80,500.

A NEW CONCENTRATOR.

The *Denver Times* says that Ex-Governor Tabor has organized a company to manufacture and introduce a new concentrator which, if it shall do what is claimed of it, will cause a revolution in mining in Colorado and the West. After the crushing of the ore it is concentrated by means of pans, arranged to work like prospectors' gold pans. Each machine has about a hundred pans on it, or has a capacity of seventy-five tons a day. From 75 to 85 per cent. of mineral is claimed to be saved, and the cost of treating the ore is only forty cents per ton.

Large Pumping Engines.

One of the largest pumping engines in the Birmingham district for draining the submerged mines has been started at Princes End at the Moat Colliery. The engine, which was supplied by Messrs. Hathorn, Davey & Co., of Leeds, is a horizontal one, with a 10-foot stroke. The pumps have two 19-inch plungers with 10-foot stroke, placed at a depth of 464 feet. The bottom lifts facing the plungers are 156 feet long. At each stroke of the plungers 245 gallons of water are brought to the surface, and the engines will raise 2,000,000 gallons of water per day. Messrs. Hawksley & Co., of Sheffield, have supplied three Lancashire boilers, 30 feet by 7 feet. The engine will dispense with six smaller engines, and will drain several miles of mineral area submerged for years. The cost of the engine and works carried out by the Drainage Commissioners is about £14,000. In a very short time the new engine will render workable immense quantities of coal and ironstone which will not contribute improvement to the present depressed state of trade.

TEMPERING MINING PICKS.

There is probably no service to which steel can be put which so effectually tests its value as mining picks. The tempering of a pick is a very nice piece of work and should be done with great care. In the first place a good charcoal fire is necessary; next, good steel, and then a good light hammer with a smooth face anvil; and lastly a man is needed with a good keen eye, considerable experience and excellent judgment. No good pick can be turned out if any of the above essentials are wanting in the process. A pick should never be "upset" or hammered endwise, or raised above a full red heat. The steel should be, moreover, heated as quickly as possible, as long exposure to heat—even if the heat is not in excess—injures its texture. Many blacksmiths find great difficulty in tempering picks, because they do not choose good steel. After being heated the pick must be worked with care, special pains being taken in drawing it out, to hammer on all sides alike, in one place as much as another, and on one side as much as the other. When ready for hardening, it should be heated in the blaze of a charcoal fire until red hot, then plunged into cold rain water and kept there until it is nearly cold; but if kept too long in the water or until it is quite cold, the corners are liable to fall off. Some blacksmiths use hot water. No salts of any kind should exist in the water, but the water should be cold; if the water is warm and a little ice should be thrown in to chill it, the tempering will be all the better. Pure soft water for hardening will make a tougher pick, and one less liable to crack at the edges than where salt water is used. The last hammering

of a pick should always be given on the flat sides, across close to the edges, and then up each side about an inch. By so doing the corners will be less liable to crack off.—*Journal of Commerce.*

The Ingersoll Rock Drill at the New Orleans Exposition.

The Ingersoll Rock Drill Company, of New York, have carried off the highest honors at the New Orleans World's Fair, where their handsome exhibit of rock drills, air compressors and other mining machinery attracted general attention. The judges have awarded them three first prizes, namely, a gold medal for the best rock drill, another for the best air compressor and still another for the best display. In making these awards, the judges, who had the best opportunity of appreciating the qualities of the different makes of machines placed in competition at the fair, side by side, have but confirmed the popular verdict and voiced the general opinion regarding the merits of the machines manufactured by the Ingersoll Company.

A RUSSIAN PLACER MINE.

A Party of Eight "Pan Out" a Pound of Gold a Day.

A recent issue of a Russian journal contains a somewhat incredible report to the effect that the latest mining news is the discovery of a remarkable placer mine about twelve miles from the river Amoor, on the China side. A majority of the miners from beyond the Baikal province, numbering about 6,000, are now at work, and as the news of the discovery spreads the force is daily augmented by fresh arrivals. The road leading to the mines is from Soatenska, the nearest town along the river Shelka and Amoor, thence a short distance across the mountains. The gold is obtained by the primitive method of washing in pans, and the work is not conducted as in well regulated mines, where the men work in rooms, but is carried on by small bands of prospectors, who work in parties of from eight to ten and take out about a pound a day. The work is not considered paying when much less than a pound a day is taken out by one party. In the villages near the mines there is no paper money in circulation, gold dust being used instead. As in all new mining camps, provisions are high, the price of meats being about \$1 a pound, and bread is the same price, while for a gallon of whiskey \$20 is the price exacted from the thirsty miners. When an offence is committed the culprit is brought before the President of the village, who acts in the capacity of Mayor. He is tried, and if found guilty is summarily dealt with. The fear of swift justice is so powerful that few crimes are committed. Gold and valuables of all kinds are left exposed without danger of being stolen.

The estimated supply of gold now available as money will not exceed \$2,600,000,000.

A few years ago a life was lost for every 30,000 tons of coal mined. Now 100,000 tons are mined per life lost.

A crane capable of lifting a weight of 147 tons is in course of construction at Hamburg. It will be the largest machine of the kind on the continent of Europe, that of Antwerp coming next with a lifting power of 129 tons.

The Gold Product of Venezuela.

United States Consul, Wm. Henderson, stationed at Ciudad Bolivar, under date of January 10th, 1885, makes a most interesting report to the State Department at Washington, concerning the resources and productions of Venezuela, from which we take the following statement of gold exported from that country, not only for the year 1884, but also for the nineteen years ended with 1884. His first table is one of the gold received from the mines and exported from Ciudad Bolivar during the year 1884, which shows that *El Callao* shipped 175,424 ounces; *Chile*, 22,970 oz.; *Panama*, 19,474½ oz.; *Potosi*, 8,509½ oz.; *Nacupay*, 574½ oz.; *Private mines*, 6,982 oz.

As usual *El Callao* heads the list; the Chile comes next, although it has not done as well in 1884 as in 1883, showing a decrease of over 9,000 ounces. Panama has done remarkably well for its first year's workings; Potosi has also done fairly well since it began work in March under the new management. Nacupay, owing to difficulties with the government, stopped work in April last and so far, Mr. Henderson says, shows no sign of starting again.

The second table shows the yearly amount of gold shipped from Ciudad Bolivar by the agencies of the gold mining companies and merchants from the year 1866 to 1884, both inclusive, aggregating, during that period of nineteen years, 1,557,567½ ounces, valued at \$29,818,000.

The chief mining field is that of Zuruary, in the State of Guayana.

It is stated that the amount produced of roofing slate in the United States alone is 500,000 squares per year. A "square" is about 100 square feet.

A Working Colliery at the Antwerp Exhibition.

The *Colliery Guardian* says:—The colliery at the Exhibition is a great attraction. It was a happy idea of MM. Desenfans and Soupart to exhibit a complete model of the underground workings of a coal mine, not in miniature, but in full size. There is the drawing shaft, down which the visitor may travel into the darkness of workings some 30 feet below ground. Here he will find every thing as it exists in an actual mine, less the fire-damp. A wag the other day suggested the propriety of introducing a little of the latter occasionally, just to show the effect of an explosion, but we have not learned that the suggestion has yet been acted upon. There are roads, faces of work, and drifts in progress; even the water and the dirt have not been forgotten, as the visitor will learn on returning to the daylight. Real miners have been provided to show how the work is performed, and horses, not less real, are there to haul the trains of ore-tubs to and fro. Such an exhibit was sure to attract by its novelty, but the result is even greater than the expectation of the promoters. The pit-bank is crowded from opening till closing time by persons patiently waiting their turn to descend. When Old London is worn out at South Kensington, a colliery might be transported thither with every chance of its turning out to be equally attractive.

The conclusion of Professor G. H. Kinahan's paper "On a possible Genesis of the Canadian Apatite," begun in our June number, will appear in the August issue of the REVIEW.

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NOTICE TO CONTRACTORS.

SEALED TENDERS addressed to the undersigned, and endorsed "Tender for Rolled Iron Joists and Steel Plate Girders for the New Departmental Buildings, Wellington Street, Ottawa, Canada," will be received at this office until Saturday, the 25th July next, inclusively, for the Supply and the Erection of Rolled Iron Joists and Steel Plate Girders for the New Departmental Buildings, Wellington Street, Ottawa, Canada.

Plans and specifications can be seen at the Department of Public Works, on and after Monday, the 6th day of July.

Tenders must be made on the printed forms supplied. Each tender must be accompanied by an accepted bank cheque, made payable to the order of the Honorable the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party decline to enter into a contract when called on to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned. The Department will not be bound to accept the lowest or any tender.

By order,
A. GOBEIL, Secretary.
Department of Public Works,
Ottawa, 2nd July, 1885.

FOR SALE.
**DEVELOPED
PHOSPHATE MINE**

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THIS location has been pronounced by experienced practical miners one of the most promising apatite producing properties in the district. There are over TWENTY SURFACE EXPOSURES OF GOOD PROMISE, and one deposit now being worked that proves an extensive body of phosphate AT A DEPTH OF FIFTY FEET.

Price reasonable and satisfactory reasons given for selling.
Full particulars obtainable at this office.



NOTICE TO CONTRACTORS.

SEALED Separate tenders addressed to the undersigned and endorsed "Tenders for Hot Water Heating Apparatus, Barrie, Ont.," will be received at this office until Monday, 20th inst.

Plans and specifications can be seen at this Department, Ottawa, and at the office of Messrs. Kennedy, Gavillier & Holland, architects, Barrie, Ont., on and after Thursday, 2nd inst.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque, made payable to the order of the Honorable the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party decline to enter into a contract when called on to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

By order,
A. GOBEIL, Secretary.
Department of Public Works,
Ottawa, 2nd July, 1885.

PHOSPHATE PROPERTY
In the Township of Portland West,
FOR SALE.

Lots 25, 26, 27 and 28, in the 3rd range. Some excellent surface shows have been uncovered on these lots and only require capital for developing. Price and particulars given at the office of the MINING REVIEW.

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White Marble Quarry on Calumet Island.

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Address all Communications to

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CANADIAN MINING REVIEW

VOL. 3.—No. 6.

1885—OTTAWA, AUGUST-SEPTEMBER—1885

VOL. 3.—No. 6

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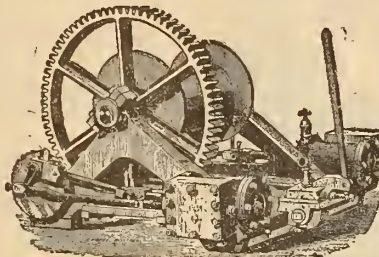
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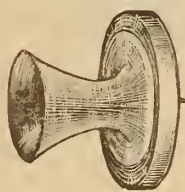
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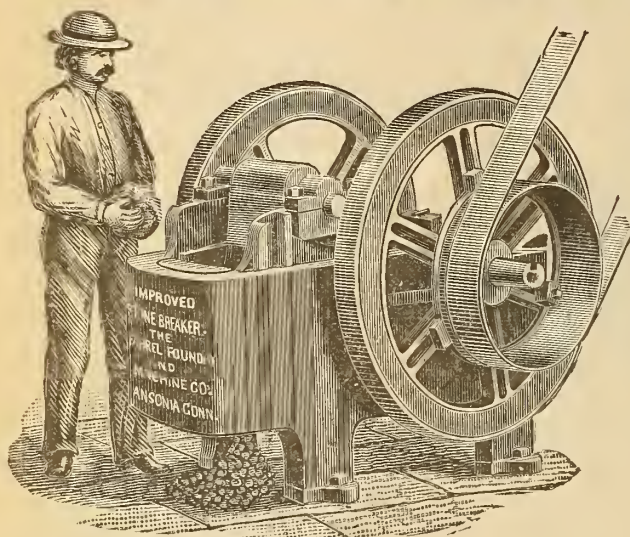
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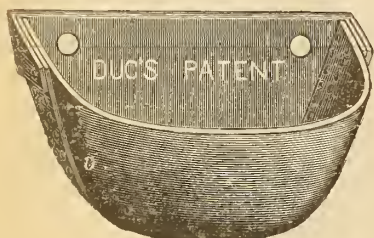
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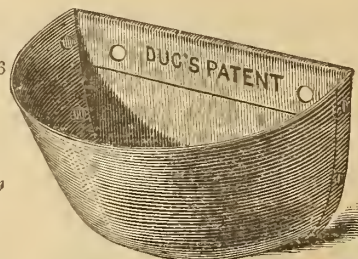
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Range, Portland East,
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Of 8 to 10 Horse-power, also
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Of 15 to 20 Horse-power.

All must be in good working order
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MAIL CONTRACT.

SEALED TENDERS, addressed to the Postmaster General, will be received at Ottawa until noon, on FRIDAY, the 28th Aug., 1885, for the conveyance of Her Majesty's Mails, on a proposed contract for four years, six times per week each way, between

Ottawa and Richmond,
from the 1st October next.

The conveyance to be made in a Passenger Stage, drawn by two horses, via the Post Offices at Hint nburg, Skead's Mills, Bell's Corners, Fallowfield and Twin Elm.

The Mails to leave Richmond daily (Sundays excepted) at 6:30 a.m.; and arrive at Ottawa at 10:30 a.m. To leave Ottawa at 2:30 p.m., and arrive at Richmond at 6 p.m.

Printed notices containing further information as to conditions of proposed contract may be seen, and blank forms of Tender may be obtained at the Post Offices of Ottawa, Eintonburg, Skead's Mills, Bell's Corners, Fallowfield, Twin Elm and Richmond, and at the office of the Inspector.

T. P. FRENCH,
Post Office Inspector.
Post Office Inspector's Office,
Ottawa, 3rd July, 1885.

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50 Good Miners
Wanted. 50

Wages. \$1.25 per day; regu'ar board, \$3.00 per week.

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Farmers, Miners and Prospectors having unbroken Phosphate Crystals for Sale can find a cash purchaser by applying at the Office of

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Canadian Mining Review

OTTAWA.

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UNION CHAMBERS, 14 Metcalfe Street.

The CANADIAN MINING REVIEW is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts as well as others interested in Canadian Mineral Lands are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 20th of the month.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

The gold and silver mines on the north shore of Lake Superior are attracting attention beyond the limits of the Dominion, and capital is being freely invested where owners are not unreasonable in their demands. We give some account in another column of what is being done towards developing the deposits.

Encouraging results are now being obtained from some of the gold mines of Nova Scotia. During the past two years suitable machinery has been brought in and skilled labour employed, and in all cases where this has been done, and the mines placed under efficient management, the quartz has been found to yield gold in paying quantity.

In this issue of the REVIEW will be found some interesting facts in connection with the phosphate mining industry of the county of Ottawa which are evidences of its rapid development and of the great importance it is becoming in the district. During the past two years it has been our pleasant duty to record the advancement of this industry, but never has the condition of the mines or the outlook for the future of the Canadian phosphate trade been so encouraging as at present.

We are informed by correspondents in London and Liverpool that a great number of Canadian phosphate mines are being offered in those markets. As far as we can

learn, these so-called mines, with few exceptions, are mere prospects where no development work has been done, and for the most part have not even surface indications to warrant the reports that are being placed before capitalists, or the prices asked for the properties. We are also informed that this is much the case in New York as well as abroad.

The alluvial gold deposits in Beauce are being more extensively and systematically worked this year than at any former time, and there exists no doubt that with a proper system for saving the fine gold contained in the alluvium this district will prove to be one of the most attractive mining fields in Canada for the investment of capital. The quartz ledges are also being carefully prospected throughout the district, and the results already obtained point to extensive gold quartz mining in the near future.

The asbestos mines of the Eastern Townships are giving employment to a large number of quarrymen and labourers and are being worked with much energy and very profitably. The output of these mines is of a quality equal to that of any asbestos mines in other parts of the world and has become well known in the European markets, and is much sought after by dealers and manufacturers. This industry has been making rapid strides during the past three years in the county of Megantic, and the entire serpentine formation in the district has been thoroughly explored, to a great extent prospected, and the mines that have been located are being systematically and profitably developed.

We find further testimony to the great mineral wealth of our Lake Superior district in the *Chicago Mining Review*, as follows:—

"There are evidences which prove beyond a doubt that the Lake Superior country is destined to become one of the most important mineral regions of the world. Nature, as far as her gifts have been brought to light, evidently gave with lavish hand to this favored section, the extent and variety of whose resources have never been appreciated."

Speaking on the same subject, Prof. Chas. F. Eschweiler, in an interview with the editor of the *Port Arthur Sentinel*, said:—

"The mineral wealth and the really wonderful resources of the country cannot long be hidden from practical men of means. You have here the proper geological formations in which to look for the minerals. You have evidences on every side of you of the disturbances of the rocks which make a mineral country. You have the veins,

and in many of them I have now no doubt you have the minerals in paying quantities. I was a skeptic of your mineral resources when I put foot in Port Arthur. I am now a strong believer in the country; strong in the faith that you are surrounded by one of the most promising mining fields on the face of the earth. This is saying much more than I ever said of any country before, and much more than is necessary. You ask me what I have seen that leaves these favorable impressions on my mind? Well, sir, I will tell you that I have seen enough to convince the most stubborn unbeliever that you have veins in this country that will pay handsome dividends to investors if they will but work them in a proper way. I have been into your silver region, known as the Rabbit Mountain District. I saw enough there to convince any man of the value of your silver veins. I do not like to particularize where there are so many assurances of the value of the veins. On seeing the Beaufort mine I determined to go on further without examining the country around it. I camped near it and made and secured a discovery in less than a week. I was satisfied with the richness of your silver country. Some people say the silver deposits are only to be found at surface. That is true only in local instances the result of local causes. I could soon explode that theory in a way you would understand. Then I desired to see something of your gold district, and made a tour of inspection of several gold bearing veins. I saw them and am convinced of the great value of your gold country. 'See Naples and die' is an old expression. I say, let any mining man see the Huronian mine vein and he will be convinced of the value of your gold country. Good as it is, it is not the only promising vein I saw in the gold region. I examined several that in history will leave their own great record. Believe me, sir, I am not a sanguine man. I have seen too many disappointments in mining adventures to admit of any indiscretion in expressing my views now. But I can tell you this, that during an active life of forty years among many mines, I never saw a young country with such a promise as this district has."

The Nova Scotia meeting of the American Institute of Mining Engineers will open at Halifax on September 15th, and promises to be not only interesting and instructive to the visitors but of much importance to the Province. It is expected that 200 to 250 members will be present at this meeting which promises to be a grand success. Arrangements are completed for the entertainment of members and guests, including, besides the inspection of the picturesque city and suburbs of Halifax, a sail down the harbor, a drive to the Montagu gold district, and excursions to the Pictou and Sprunghill coal regions, Londonderry iron-works, Cape Breton, the Joggins, Grand Pré (the country of *Evangeline*), etc.

Prospectors should be encouraged in every way, and not looked upon as visionary men who dislike regular work. Many

good miners make poor prospectors. Prospecting is a kind of work for which some men are particularly adapted, and because they lead a nomadic life it is no reason that they are not as good citizens as those living in a town for years. They are the pioneers of the mining camps, and serve a most useful purpose since the result of their searches is the basis of the mining system. —*The Press, Idaho.*

America has long been celebrated among mineralogists as the home of enormous crystals; and the prodigious specimens of apatite, beryl, and other minerals, have been the subject of wonderment. But for size the crystals of spodumene exposed in the excavations upon the Etta tin mine, in Pennington county, Dakota, carry off the palm. Professor Blake, reporting on the subject, is authority for the statement that one of these crystals is *thirty-six feet in length* in a straight line, and from *one to three feet in thickness*. The cleavage is smooth and straight, but the lateral and terminal planes are obscure. Crystals from five to twenty feet long are numerous, and recline in all directions.

Notice has appeared in the *Canada Gazette* that application will be made for Letters Patent of incorporation, under "The Canada Joint Stock Companies Act, 1877," for the "North America Mica Company," with \$1,000,000 capital stock, divided into ten thousand shares of one hundred dollars each. The names and residences of the applicants are:—D. L. McArthur, Winnipeg; W. S. McLennan, Winnipeg; W. L. Boyle, Winnipeg; James Fisher, Winnipeg; Alex. Matheson, Rat Portage; Geo. McPherson, sr., Anabaskasing Bay; J. C. Hunter, Duluth, Minn.; A. R. Macfarlane, Duluth; and A. M. Morrison, Duluth. The head office of the company is to be Winnipeg, and its object is to develop the mica, asbestos and other mineral resources of the land it holds or may acquire in Ontario, Manitoba and the North-West Territories.

THE PHOSPHATE TRADE.

This has been a season of unusual activity at the phosphate mines of the du Lievre River district, and miners have met with much encouragement. The large increase in the output of the more important mines is evidence that Canadian phosphate is coming more and more into demand as the mineral becomes better known and that mine owners are not dissatisfied with the present market price. True it is that some years ago the price paid in England for our phosphate was a good deal higher than it is now, but the margin of profit to producers was then little, if any, greater. The cost of transportation in former days added quite two dollars per ton for delivery at points of shipment, and ocean freights ruled much higher than they do to-day. Now the increased railway accommodation and summer transportation on the du Lievre river have reduced the cost of delivery from the mines to Montreal to a minimum.

Ocean freight, a few years ago, could not be relied on at less than fifteen shillings a ton while for the past two years eight shillings has been the highest paid, and five shillings may be said to have been the average rate; so that by the reduction in transportation charges the output of our mines can now be laid down in London, Liverpool and other British ports at about \$4.50 per ton less than formerly. This in itself will compensate for a considerable falling off in values. But it is not at all likely that the phosphate market will remain sluggish, if it can be styled so at the present time; it is only in sympathy with general trade which is characterized, the world over, as being greatly depressed; and it has this advantage, there is a demand for every pound of mineral that can be produced, at a price that shows a margin of profit of from 75 to 100 per cent. on the cost of production. That an increased demand for Canadian phosphate is imminent there exists not the slightest doubt; the high grade of the mineral has brought it much into favour in Germany and France, in which countries there is an increasing consumption, and in England our phosphate is now better known than it was when shipments did not exceed four or five thousand tons annually. A letter recently received from one of our mine owners, dated London, gives a most encouraging report of the probable future for the product of our mines in that market. He says: "I am much encouraged as to the future demand for Canadian phosphate. The objections which were to be encountered on all sides a few years ago have now subsided, and the difficulties that had been met with in its use have for ever been overcome. A low grade Belgian phosphate, soft and of a dull shade, is coming largely into use here in England, which is found to combine well with Canadian, and a large supply of the latter is wanted for this purpose. Demand is not limited, but prices, though steady, are in sympathy with the depressed state of all agricultural markets. There is some question as to the continuance of the supply of Spanish phosphate, and this together with the high cost of Norwegian, favours an increased demand and higher prices for Canadian in the future.

THE MINES.

To describe the mines now would be but to repeat what we published in our last number. They are all turning out ore in large quantity and doing excellent work towards further development. The deep workings are all showing immense bodies of mineral which in every instance is found to be purer and more free from admixture with foreign matter than are the deposits near the surface, and hence there is a great saving of labor in cobbing and dressing the output. The production of the more important mines in the district for July and August has been most satisfactory.

The Emerald, with an average force of 80 men, all told, has produced an aggregate of 1,460 tons during the past two months.

The North Star, with a force of 65 men, including all classes of workmen, has produced 1,210 tons.

Star Hill Mine, during the past two months has given employment to an average force of 102 men and has turned out 1,214 tons.

High Rock Mine, with 130 men employed for the last two months has mined and dressed 1,380 tons, making a total output, for the months of July and August, for the four mines of 5,264 gross tons with a force aggregating 377 men.

The *Little Rapids* mine, of which we gave a full description last month, continues to improve with development, and although but a small force is employed the monthly output is more than sufficient to cover all expenditure for the large amount of dead work that is being done in opening up new veins. It may be said that there is no mining being actually done here, the object being to thoroughly prospect the deposits before attacking the bodies of mineral of which there are several thousands of tons in sight in the shafts and open workings. Buildings are being erected for the accommodation of a large number of miners and other improvements are being made for the advantageous handling of the output of the mine.

The *Gold Hill* mine has been quite recently opened in the Gore of Templeton and promises to develop well. Work was begun on this property on August 5th with a force of 15 men and already upwards of 50 tons have been forwarded to point of shipment.

The mines of the Du Lièvre district have been visited during the summer by a large number of strangers from the United States, England and Europe, all of whom have expressed much surprise at their condition and the large quantity of phosphate they are producing. The quality of the mineral also has been very highly spoken of by these visitors and a great future for the industry predicted by them.

PHOSPHATE QUOTATIONS.

The foreign market remains steady and prices have not varied since last report. The market continues firm at 1s. 1/2d. for 75 per cent., a fifth of a penny rise, ex-ship London and Liverpool.

OCEAN FREIGHT.

Little variation has been reported during the summer months; S.S. rates from Montreal to Liverpool and London varying from 6 to 8 shillings per ton.

PHOSPHATE SHIPMENTS from MONTREAL for JULY and AUGUST.

Date.	Vessel.	Destinat'n.	Shippers or Agents.	Tons.
July 3	S.S. Ontario...	Liverpool...	Lomer, Rohr & Co	360
" 6	S.S. Benbrach...	London...	Wilson & Green.	253
" 6	S.S. Benbrach...	"	"	100
" 9	S.S. Ocean King	"	Lomer, Rohr & Co	268
" 9	S.S. Bristol...	Bristol...	Wilson & Green.	498
" 10	S.S. Elgonshire	London...	Lomer, Rohr & Co	262
" 16	B'g. Hafrstjord	Cardiff...	Millar & Co	65
" 16	S.S. Carmona...	London...	Lomer, Rohr & Co	502
" 16	S.S. Montreal	Liverpool...	"	250
" 17	S.S. Texas...	"	"	135
" 18	S.S. Oxenholme	"	"	427
" 18	"	"	Millar & Co.	270
" 21	S.S. Escalona...	London...	Lomer, Rohr & Co	255
" 21	S.S. Scot and	"	Irwin, Hopper & Co	100
" 23	Barq. Merritt...	Sharpness...	Wilson & Green.	45
" 23	S.S. Mississippi	Liverpool...	Lomer, Rohr & Co	135
" 24	S.S. Somerset...	Bristol...	Wilson & Green.	386
" 24	S.S. Storm Queen	London...	A. D. Cameron...	276
" 25	S.S. L. Nepigon	Liverpool...	Wilson & Green.	250
" 29	Barq. Johanna...	Hull...	Lomer, Rohr & Co	40
" 29	S.S. Aslona...	London...	"	174
" 29	S.S. Kehrweider	Hamburg...	"	548
" 29	"	"	Lievre Riv. Phos	256
" 30	S.S. Brooklyn...	Liverpool...	W. M. Knowles.	91
" 30	"	"	Millar & Co	27
" 30	"	"	Lomer, Rohr & Co	280
Aug. 1	Barq. Scotia...	"	"	100
" 3	S.S. Eel King...	London...	"	180
" 5	S.S. Dominion...	Liverpool...	"	277
" 5	Barq. Achille F	Penarth Rs	"	100
" 7	S.S. Oregon...	Liverpool...	"	241
" 8	S.S. Quebec...	"	"	184
" 8	S.S. L. Winnipeg	"	Wilson & Green.	300
" 13	S.S. Dracona...	London...	Lomer, Rohr & Co	310
" 13	S.S. Sarnia...	Liverpool...	"	428
" 15	S.S. L. Champ'n	"	Millar & Co	325
" 20	S.S. Montreal...	"	Lomer, Rohr & Co	210
" 21	S.S. Ocean King	London...	"	200
" 27	S.S. Carmona...	"	Wilson & Green.	195

Total for July and August..... 9,243
May and June..... 5,347

Total to date 14,590

Villeneuve Mica Mine.

The value of this mine has long since been established, and as work progresses in the drift—that is being run into the mountain side the depth and continuity of the micaceous lead is more and more positively demonstrated, and the crystals become more compact, larger and more free from defect than those that were mined near the surface. The floor of the drift or tunnel, from its mouth to the extreme end, a distance of sixty feet, is thickly studded with well formed crystals lying on their edge in the vein of white quartz and feldspar. The walls also, and the roof of the tunnel show innumerable crystals of mica, well formed and of good average size. There is now at the mine about ten tons of crystals sorted into grades, as regards size and quality, which will be cut and otherwise prepared for market. A contract has been given for the erection of a cutting-house that will afford accommodation for a force of workmen adequate to the output of the mine. It is expected that all necessary preparations for carrying on permanent work will be completed about the first week in September, after which this mine will supply a large quantity of mica of a quality such as has never before been produced in Canada and better than which is not produced at any mine in the world.

Galetta Lead Mine.

This mine, situated about seven miles from Arnprior, produced during last year 294 tons of galena, which was manufactured into lead at Kingston, yielding 2,883 pigs, or 155 tons of pure lead. New machinery had been ordered and it was expected that the output for the present year would show a large increase. We are informed, however, that work at the mine has recently been shut down.

OTTAWA AT ANTWERP.

The great success which has attended the Antwerp exhibition, and particularly the Canadian exhibit, has called forth most flattering comments from the European and British press.

The Canadian court is situated between the English and German sections, with the exception of the Manitoba Farm exhibit, which occupies a separate and distinct position.

In the Industry section Mr. W. A. Allan, of Ottawa, exhibits some very fine specimens of apatite from his *Little Rapids* mine in Portland East; 36 specimens of mica from his Villeneuve and Pike Lake mines; and a magnificent specimen of apatite crystal mounted on a pedestal.

The Canadian Granite Company exhibits some fine specimens of red granite from its quarry on Deadman's Bay, and Prof. Selwyn a large number of specimens of ore, whilst the Geological Survey is represented by 292 specimens of Canadian ores, pebbles, building stones, &c., together with an obelisk, representing the gold obtained from the auriferous deposits of British Columbia during the past twenty-four years, which is valued in official returns at \$48,672,128.

The manufacture of rope from asbestos bids fair to become an industry of considerable importance in England.

A prominent broker has recently sold 1,000 tons of steel rails from the Pennsylvania mills, to be delivered in Illinois before 1886, at \$29 per ton. Eight months ago the same quantity of steel rails was sold to the Canada Pacific road at \$26 per ton.

IRON MINES.

THEIR DEVELOPMENT IN CENTRAL ONTARIO.—
FURNACES LIKELY TO BE ERECTED.—
THE OUTLOOK.

The report of the Commissioner of Crown Lands of the Province of Ontario, for the year 1884, which has reached us since our last number issued, contains interesting information concerning the iron mining industry in the Province. In the counties of

FRONTENAC, LANARK AND RENFREW
the iron ore output, during 1884, is reported to have been 18,094 tons, 15,094 tons of which were shipped to the United States, the balance, 3,000 tons, had not been forwarded.

On account of the depressed state of the iron markets, the mines in Eastern Ontario have been worked but to a limited extent during the past two years.

THE MINES.

ZANESVILLE IRON MINE.

This mine is four miles from Bedford station on the Kingston and Pembroke Railway, with branch line into the mine, which is situated on the shore of Thirteen Island Lake, with shaft sunk to the depth of 200 feet. The machinery is driven by steam, with air compressor, capable of driving fifteen drills. The hoist loads ore direct from the shaft on Kingston and Pembroke Railway cars. Value of machinery, \$10,000. Owing to the depression in the iron market there were only from ten to fifteen men employed during the past year, whereas if the machinery were worked to its full capacity 100 men would be required.

ROBERTSVILLE MINE.

The Robertsville Mine, in the Township of Palmerston, on line of the Kingston and Pembroke Railway, with shaft sunk to a depth of nearly 200 feet, has machinery valued at \$8,600. Very large quantities of ore have been taken from this mine in past years, but during 1884 it had not been worked to any extent.

WILBUR MINE.

This mine is in the Township of Lavant, and on the line of the Kingston and Pembroke Railway—worked by the Bethlehem Iron Company—and the ore forwarded to their works in Pennsylvania, for the manufacture of Bessemer steel. The shaft is sunk to a depth of about 200 feet, mine opened about 350 feet in length underground, has all necessary machinery for successful mining, including 40-horse power boiler, with air compressor, two portable 15-horse power boilers and Lidgerwood hoist. This machinery is capable of 3,000 tons output per month, if worked to full capacity. Quality of ore say 55 per cent. metallic iron.

BOYD-CALDWELL MINE.

This is adjoining the Wilbur Mine, and on same vein, sunk to a depth of about 200 feet; has been worked with steam drills, by a 15-horse power boiler. Hoist lands the ore on platform of Kingston and Pembroke Railway. No ore has been forwarded from this mine during the past year, but there is an output of about 3,000 tons ore ready for shipment.

CALDWELL AND GILDERSLEEVE MINE.

This mine is a half-mile distant from Flower station, Kingston and Pembroke Railway, Township of Lavant, and has been worked with drills by a 25-horse power boiler. Shaft sunk to a depth of eighty feet, but no mining has been done during 1884.

RADENHURST MINE.

The Radenhurst Mine is about three-fourths of a mile from Flower station, and believed to be the same vein as the Caldwell-Gildersleeve Mine; is sunk to a depth of eighty-feet. Drills worked by two boilers of 10-horse power each.

CALABOGIE MINING COMPANY'S MINE.

There are three shafts sunk on east side of Grassy Bay, at Calabogie Lake, Township of Bagot, about one-fourth, one and a-half, and one and three-fourth miles respectively from Kingston and Pembroke Railway track. This mine has not been worked to any appreciable extent, not having any machinery.

WILSON-MARTELLE MINE.

This mine is also on east side of Grassy Bay, Calabogie Lake, one mile from Kingston and Pembroke Railway. Shaft sunk to a depth of thirty feet; no steam-power used up to the present. Vein about 1,100 feet in length, as indicated by survey with magnetic needle, and lies in low land, covered with about ten feet of soil. The indications point to an improvement of the ore and decrease of silica as the shaft goes down.

Analysis of ore taken from the surface by J. Blodgett Britton, of Philadelphia.

Pure metallic iron.....	60.72
Oxygen with the iron.....	23.14
Water.....	.97
Silica.....	11.78
Sulphur.....	none.
Phosphoric Acid { Phosphorus, 0.64 } { Oxygen..... 0.84 }	0.148
Alumina.....	1.09
Lime.....	1.23
Magnesia.....	0.51
Oxide of Manganese.....	0.27
Undetermined matter and loss.....	0.342
Total	100.00

The report contains the following interesting statement of the operations, during the past year, of the Coe Hill Mining Company, forwarded to the Commissioner of Crown Lands by Mr. W. Coe, Madoc. The greater part of the ore from the Coe Hill mine has been shipped to Cleveland, Ohio. This ore was then tested as to its suitability for the manufacture of steel rails. The usual test made is to allow for five defective rails out of every one hundred and twenty turned out, but I am glad to state, that the proportion on using this ore was only one in every one hundred and seventy two. The test made proved it so satisfactory for this purpose, that a considerable quantity of the ore sold was placed in this use, but owing to slackness of orders for steel rails in the depressed state of the iron market during the past season, and the consequent curtailment in their production, one establishment used this ore entirely for making crucible steel—which is the higher grade of steel for making cutlery. We have many assurances that on the renewal of business we can place every ton of ore taken from this mine in good hands at paying prices.

COE HILL MINE.

The excavations already made on the surface of the deposit are a thousand feet long and from 20 to 60 feet wide. There are now three shafts on the vein. Number one shaft is seventy-five feet deep, and is opened eighteen feet wide at the bottom from the hanging wall. There are no signs yet of the foot wall, and from all appearances this part of the deposit will prove to be of immense width. Everything taken out of this shaft has been ore of the finest quality--not a single load of rock has been separated from it. On the west end of the shaft and fourteen feet below the top or surface there is a drift driven thirty-eight feet. Close to the bottom of the shaft there is another drift driven the same direction as the one above, and communication opened from it to the first drift by

means of a wenze or small shaft. This has been done for the purpose of being better able to mine the ore, also affording a pillar in end shaft, for protecting the shaft from the blast of the holes, as well as keeping the foot and hanging walls in a firm position.

Number two shaft is 105 feet deep and is developed by means of drifts or tunnels in each end of shaft, also communication opened to the drifts by means of wenzes or small shafts, thus leaving pillars fourteen feet in thickness and from eighteen to thirty feet high for the same purpose as number one shaft. This shaft is located 500 feet from number one, and shows a width of sixty-five feet of ore. We tested this part of the property with the diamond drill to the depth of 240 feet before sinking the shaft, and got at that depth sixty-five feet of ore.

Number three shaft is ninety-three feet deep and is also developed by means of drifts east and west of main or hoisting shaft, with pillars in each end of shaft the same as numbers one and two. Number three is situated 400 feet from number two.

ARTHUR MINE.

We have done considerable work in opening up the Arthur mine in Chandos. We have about eight miles of railway to build to get to this property. This is contemplated being done the coming season. We have made three different borings with the diamond drill, in all about 500 feet, on this deposit, and find from these the ore to be in great quantity, while its quality is excellent.

CLEVELAND MINING COMPANY'S MINE.

We have been very fortunate in making a new discovery of iron ore in Tudor. This is a large deposit, and has the advantage of being situated very near to the railway. An analysis of the ore shows sixty four per cent. of metallic iron, no titanium, and faint traces of sulphur and phosphorus. This analysis is made from an outcrop of surface ore. Work has been begun here with a diamond drill and will be followed up by clearing about ten acres for the purpose of building up a location the same as at Coe Hill. Our engineer has been over the ground, and located a branch from the main railway into the mine. The work of chopping out the right of way will be proceeded with at once. We intend working the mine vigorously the coming season, and expect to make large shipments from it.

THE BAKER MINE.

We have leased this mine, situated in the Township of Tudor, to some Cleveland gentlemen. Owing to the lateness of the season when they commenced work, little could be done besides stripping and making other preparations on the surface for active work the coming spring.

THE ORTON MINE.

The mine is situated on the Free Grants in the Township of Tudor. We have just removed our diamond drill from this mine, where it has been at work for a month past. This has proved an immense deposit, but contains a percentage of titanium. We hope to be able to sell a considerable amount per year of this ore, in small quantities, to large consumers to be mixed with other varieties of ore.

GENERAL REMARKS.

The depressed state of the iron trade the past year has caused us to slacken operations in opening up new properties, but we hope that confidence in manufacturing circles will soon be restored and business activity again prevail.

In January of this year there were lying on the different docks of the United States, upwards of a million tons of ore that was mined for last year's furnace supply, which has not been used. This fact keeps the iron ore market in a very depressed state.

However, looking over American statistics, we have every reason to congratulate ourselves on the progress we have made in the iron ore trade.

On comparing the results of our business with the whole of the Marquette section—the great iron-producing district of Lake Superior—we find that the shipments from there, from 1852 to 1857 inclusive, amounted to only 85,319 tons, an average of a little over 17,000 tons per year, while our first season's operations show shipments of 30,000 tons from one mine.

THE ERECTION OF FURNACES.

Referring to this subject, Mr. Coe says: "It has been my ambition to get a furnace in operation by which we could smelt, at home, a considerable portion of our iron ore. In fact, the building of a furnace is a necessity in our business, as we have, in sorting our ores, to lay aside such grades as will not pay for shipment. The cost of mining, hoisting, and sorting these ores would be lost entirely were we not to use them; they amount to over fifteen per cent. of the whole quantity mined. These ores cost just as much as No. 1 ore, and while the metallic iron itself they contain is just as rich as No. 1, they are too lean to pay the cost of transportation, not usually averaging over fifty per cent. In every mine we open there will be at least 20,000 tons of this material, and a considerable quantity yearly thereafter. Now it is to our interest to make use of these just as well as other or best quality of ore, and to do so we must have furnaces to smelt them. The question will be asked, why have you not done so? In answer, I may say, for two reasons: Our time has been occupied in opening up mines and making freight for the railway, and doing a variety of work which is preliminary to every mining enterprise, such as constructing pockets for the ore, building up our location, and other matters comprising a variety of details which it is almost impossible to enumerate. Another reason is, that the iron trade has been in a very depressed state; values have seriously fallen with large stocks on hand, which it would be ruinous to try to compete against. We have been compelled to defer for a period the erection and using of a charcoal furnace in connection with our business. But there has been no time lost in this matter, as we consider it very necessary to have a large accumulation of ore on hand before starting a furnace; our estimate for a furnace being based upon the No. 2 ore production of five mines."

RAILWAYS.

This subject is here taken up by Mr. Coe, and of the Ontario Central Railway he says—It was built in order to develop the mineral resources of the section of country through which it passes, as well as for the accommodation of the general public; but I will first illustrate the way similar enterprises have been treated in the United States.

The Marquette, Houghton and Ontonagon Railway is a line about ninety miles in length including its branches. This was the pioneer line in the famous iron fields of Marquette County, Lake Superior. A large land grant subsidy both from the general Government and the State of Michigan was given to the road, and by which the road was aided more than three million dollars. The North-Western Railway also received large aid in the way of land grants.

The Detroit, Mackinaw and Marquette Railway, which now reaches these iron mines, likewise received a large land grant.

The Duluth and Iron Range Railway, completed last summer from Two Harbours, on the north shore of Lake Superior, to Vermillion Lake Iron Mines, a line about seventy-five miles in length, received a land grant from the State of Minnesota, the pine alone from which was more than sufficient to pay the entire expense of the road, a sum considerably in excess of two millions of dollars, all the mines being given as well to the company. We lay down our ore on the docks at Cleveland, beside the product of these subsidized companies, and pay a tariff charge of seventy-five cents per ton to the United States Government for the privilege of doing it. In marked contrast is the policy of the United States in developing these great natural storehouses of wealth to that pursued towards our company in attempting to develop a similar enterprise. We have not received one dollar of aid from Government, municipality, or individual; but fault has been found with us for buying less than one-tenth the amount of lands given to any one of the companies named, for which the Government had never been able to find a purchaser. How can it be hoped that enterprises of this kind in their infant state can flourish without the fostering aid of the Government, similar to that given like enterprises in adjoining countries. A railway has never been built nor works like ours attempted to be prosecuted, outside our own company, without assistance of some kind. If the Government desires the success of this and kindred enterprises, we feel it ought to treat us, as all other enterprises of this kind, which have succeeded, have been treated both in this country and in the United States. The money paid for these lands is paid under a feeling of protest, as we think the Government is exacting outside pay for what it could and should freely give us. If the results indicated by the figures above given are more desirable than the stale barren rocky ridges in their natural state, through which our road passes, and in which our mines are located, we hope that the Government will indicate its appreciation of them by giving such aid as is easily within its power, by refunding the money paid for these lands.

THE MINERAL BELT OF ONTARIO, extending from Lake Nipissing to the Ottawa River, comprises ten times the area of any known mineral territory in the United States, but there is this difference, in our country the process of development has only commenced, while in the States the minerals have been opened out and the mining industry long since passed the experimental stage. The building of the Central Ontario Railway has done a great deal to encourage enterprise on the part of prospectors and mine owners in the section through which it passes by providing means and facilities for the ready transportation of ore and supplies. There is a necessity for similar roads every thirty miles distant between Nipissing and Ottawa, and there would be a business similar to that now done by the Central Ontario for each of the roads when built. I believe if the interior of the country was opened up by lines of railway branching from the Canada Pacific Railroad they would not only pay but prove an immense feeder to that road, which would then be the backbone of a system running into and developing the great mineral belt of the interior, the products of which would thus find an outlet to the markets of the world, and the results would soon show themselves in the marked increase of Ontario's wealth and population.

It is a subject which will eventually attract public attention, and when the magnitude and importance of the interests involved are fully known, it will be a matter of surprise that these opportunities should have been so long neglected and unimproved.

In conclusion Mr. Coe says: The import duty now paid by shippers to the American Government on iron ore is a serious drawback to the successful carrying on of this trade. I should like very much to see reciprocity in natural products between the two countries, which would remove this embargo and put us on more equal terms with the ore-producing interests of the Lake Superior sections.

AN EPITAH.

SACRED TO THE MEMORY
OF THE
WESTERN IRON ASSOCIATION.
BORN IN PITTSBURG, PA., 188-.
DIED IN CINCINNATI, O., 1885.
OF RICH BUT RESPECTABLE PARENTAGE,
IT HAD A ROUGH STRUGGLE
WITH ADVERSITY
AND DIED AT A TENDER AGE.
DEPARTING,
IT LEFT BEHIND A RECORD
FULL OF GOOD DEEDS AND BAD MISTAKES.
ITS CHIEF AIM
SEEMED TO BE A DESIRE
TO
BENEFIT THE IRON TRADE,
BUT
IT WAS SINGULARLY UNFORTUNATE,
IN THAT
IT RARELY ACCOMPLISHED ANYTHING
EXCEPT TO AFFORD
ITS PITTSBURG PROGENITORS
OPPORTUNITIES OF GETTING
THEIR OUTSIDE BRETHERN
INTO VARIOUS FORMS OF TROUBLE
AND THEN
WITH REFRESHING UNANIMITY,
SIGNING THE SCALE
AND
SCOOPING IN THE CONTRACTS.
FROM THIS EXPOSURE
TO SUDDEN CHANGES OF TRADE CLIMATE
IT CONTRACTED
A CHRONIC FORM
OF WHAT IS KNOWN AS
PITTSBURG WIND COLIC,
WHICH,
COMBINED WITH WESTERN CHILLS,
BROUGHT ABOUT
ITS EARLY AND LAMENTED DEMISE.
READER, PONDER!
EVEN IRON ASSOCIATIONS
ARE BUT HUMAN.
LEARN FROM THIS
THAT
IT IS THE LONG POLE
THAT KNOCKS THE PERSIMMONS.

Put aside the little wage-scales;
Do not try to force a "boom."
Little Josie will not need them—
He's gone up the golden flume.

Iron Trade Review, Cleveland, O.

MINES NORTH OF LAKE SUPERIOR.

Their Development Progressing—Immense Bodies of Ore—Rich in Gold and Silver.

The mines of Thunder Bay are attracting as much attention at the present time as those of any other mining locality in North America, and deservedly so. During the past few months they have been visited by a vast number of scientists, capitalists, and practical mining men, among whom there is a consensus of opinion as to the unquestionable richness of the enormous mineral region which is now being explored and prospected. It cannot be said, however, that the mines which have been opened up are being developed by their owners with that degree of push and energy which characterizes mine owners in the Western States and other mining districts, and it is only just to suppose that the reason for this is found in the fact that the capital employed is inadequate to the requirements of the mines. Before much can be accomplished towards a proper development of these valuable properties, machinery and other mining plant must be brought on the ground, and little can be done in this direction until transportation is facilitated by the construction of permanent roadways. That this may be speedily done, the Ontario government should be liberal with its grants, and in the absence of government aid mine owners should adopt a policy of co-operation and do the work themselves if they have means at their disposal for this purpose. If they are without the necessary capital to carry on this important work and to establish their mines on a paying basis, then they should offer sufficient inducement to capitalists to come to their assistance. *The Engineering and Mining Journal*, commenting on this very subject, points out that the parties who own the prospects, thus far discovered in the Thunder Bay district, are for the most part with means wholly inadequate to develop or successfully work mines; but with the exaggerated confidence of ignorance, they are all convinced that a prospect is a mine, and they accordingly put prices upon their property which are far too high for any prudent capitalist to pay. It may be that a few bonanzas near the surface can be worked with profit; but the present owners, or those buying at their prices, will have to go through the usual experience until they get educated up to the appreciation of the fact that the value of a mine is the net value of the ore actually proved by shafts and levels, and that the man who invests his money to work a mine is he who takes all the risk, and should have most of the chances in his favor. Nothing can be more injurious to the interests of a new mining field than to fall into the hands of those who can not work it themselves, and who put such high prices upon the prospects as to keep capital out or cause what goes in to be unprofitable.

THE MINES.

At *Rabbit Mountain* mine little work is being done at present. Several prospect shafts have been sunk on this location, all of which show good silver bearing rock, one of them at a depth of 150 feet showing a seven foot vein of fairly rich ore. A large heap of high grade ore taken from the shafts awaits the crusher. It is said negotiations are in progress which, if carried to a successful issue, will enable the owners of this property to proceed with operations on a permanent and business-like basis. Meanwhile a few men are engaged in collecting from the dump all the pay ore.

SILVER MOUNTAIN MINE.

Here quite a village is springing up but very little opening has been done at the first dis-

covery on this location. There is plenty of ore in sight and native silver can be seen well disseminated through the dump at the opening that has been made. We are informed that five sixths of the eastern half of this location has been sold to Cleveland capitalists, who are preparing to take in machinery and to get to work systematically to develop this truly valuable property, whose enormous richness is admitted by every one who has inspected it, all of whom express surprise that more work has not already been done towards opening up the vein. The Cleveland people have now twenty men employed doing preliminary work.

BEAVER MINE

is now working day and night and good progress is being made. This mine shows to great advantage; the mountain on which it is situated is over two hundred feet high with the vein uncovered, cross-cut and driven into on the escarpment on both sides, all the vein matter being, it is said, good pay ore.

TWIN CITY MINE.

Here considerable tunneling has been done but the mine has been idle latterly, pending the completion of the waggon road which will enable the company to take in its mill and such machinery as will be suitable for the reduction of the ore. When this has been done mining operations will be actively resumed. The ore now on the dump at this mine is very rich in silver.

Explorers have been numerous and busy during the summer throughout the Silver Mountain region and much prospecting has been done. Claims have been taken up in all directions and a number of mines have been located. Within a few miles of the *Rabbit Mountain* mine there are the *Silver Creek*, *Cambrian*, *Silurian*, *Crown Point*, *Silver Falls* and *Silver Hill* mines, all of which promise to develop into valuable properties.

HURONIAN MINE.

In the gold bearing district, adjoining the silver region to the north and west, is situated this very rich gold mine. On the property owned by the Huronian Mining Company is a decided fissure vein of gold and silver bearing quartz, having an average width of over six feet, which has been exploited for a distance of 2,500 feet. The vein is highly mineralized throughout its entire length and carries, as far as tested, the sylvanite ore, a compound of gold, silver and tellurium. The entire vein matter is pay ore while some of it is extremely rich. A shaft has been sunk on the vein to a depth of 140 feet, at the bottom of which rich sylvanite ore is found. Dripping has also been run on the vein for a distance of 160 feet and some stopping has been done, all of which workings have proved the persistency of the vein in its mineral features. Free gold has been constant in all the workings, and gold and silver are not only finely disseminated throughout the veinstone, but they are in union with the sulphurets with which the vein is so heavily charged.

The mine is now being worked under new management, and from what is known of the results already obtained under former management there is no doubt that it will become ere long one of the best paying mines on this continent. The ore which has been taken from the shaft and drift has yielded an average of \$20 the ton in gold, and it has been since discovered that a large portion of the gold was lost owing to the imperfect machinery employed, which consists of a ten-stamp mill, two Frue vaners and a concentrator. A recent assay of the

ore, by Ledoux & Ricketts, New York, gives 138.40 ounces in gold, and 1057.32 ounces in silver per ton (2000 lbs.), equivalent to a money value of nearly \$4,000. This was, of course, selected ore; but it is not at all unreasonable to expect, after what has already been demonstrated, that the entire veinstone will yield an average of \$30 the ton if properly treated by suitable machinery and under efficient management.

THUNDER BAY COLONIZATION RAILWAY.

It would appear there is now some hope that this much needed line of railway will be constructed in the near future. The Dominion government has granted a subsidy of \$3,200 per mile, and the route has been explored and reported on by Mr. Wm. Murdock, C.E., who is quite enthusiastic, not only as to the necessity of the railway, but on account of the easy location the country affords and the natural richness of the section the railway will penetrate. Mr. Murdock in his report, says:—

"This railway would connect Port Arthur and north shore stations with the American system of railways at Duluth, and thus supply an urgent need without doing injury, but on the contrary, assisting the traffic of the Canadian Pacific railway.

"The proposed route would open up an entirely new country, and would pass through the finest forests of the district, the richest silver country on the continent, and the Iron Range Railway has the largest deposits of the finest iron in America, which would be all tributary to this line of railway, and on either side of the proposed line, the soil is suitable for cultivation, and the greater part of it would produce crops equal to any grown in Manitoba.

"It would supply the struggling mining industry which must have railway facilities to foster and establish it.

"The line as laid down by me is the correct one, inasmuch as it would give railway facilities to all the working mines, without favoring any particular one. The mining industry of the district will bring millions of dollars of foreign capital to the country, if assisted by railway facilities in time.

"The route throughout presents no engineering difficulties, and would simply be ordinary railway work similar to the Canadian Pacific between Port Arthur and Savanne, and the same in distance."

British Columbia's Mineral Deposits.

What is Being Done this Year to Develop Them.

Mr. Amos Bowman, Mining and Civil Engineer, of the Dominion Geological Survey, arrived in Victoria early in July on a mission of much importance to British Columbia, that of specially examining the mineral deposits of Cariboo, and reporting and mapping the same, and obtaining every general information possible in reference to the mines of the district. The work of the Dominion survey in that province has heretofore been confined to locating and examining a certain belt in blocks to connect with surveys in the east, so as to have one continuous belt from sea to sea.

The Dominion and Provincial authorities have combined this year, and each appropriated \$2,500 for the purpose of the present survey. In previous years the amount set apart was too small to allow of more than a superficial survey being made, for the geologist had to also act as geographer. The appropriation this year will obviate this, and the services of a geographer have been secured for that special work. Mr.

McCoy, of Ottawa, a graduate of McGill, has been sent out as a general assistant, being specially adapted for that position, while Mr. Voligny, of New Westminster, has been employed as draughtsman and topographical assistant, which will enable the work done to be reported quickly, as draughting can be done while in the field.

Mr. Bowman will thus be able to devote his whole time to the geological work, and will examine the various mining districts in Cariboo, and it is expected that good results will follow. The design is to map out the placer mines where worked, and denote them on a map, with amounts of gold taken out marked, and also to locate and determine the extent and worth of quartz ledges. The direction and extent of the gravel formations will be gathered, and every information that will be of use in mining will be clearly shown in map form. Districts that have been worked will be mainly followed. The benches of the Fraser will also be examined. These were undoubtedly a lake country and extend into the mountains to gravel deposits, some of which contain gold while others do not.

Another feature that will be demonstrated, it is thought, is that the rich mineral deposits which occur in Utah and north of that state also exist in British Columbia in the same mineral belt. There is little doubt but the rich deposits which prevail south also exist in the province and northward to Alaska. Of course this will all have to be determined afterwards by the prospector. However the maps will be prepared showing the mineral belt which will prove of great assistance to the prospector in his work.

The age of the gravel deposits will also be determined, whether tertiary, glacial, volcanic, or of a later period, and it will be shown when and how these deposits were placed in Cariboo. The reports will be printed and given to the public as quickly as made, and the means at the disposal of the survey are such that this can be readily done.

BEACON HILL QUARTZ.

A Shaft Partly Sunk on a Ledge at Finlayson Point, Victoria, B.C.

The last quartz excitement that interested people was the reported rich strike at Goldstream, in which a number of contractors and engineers were interested, and from which they had great expectations. However, it has quieted down and we hear no more about it, further than the query of a stranger when he picks up the specimen from the collection on our office table. But there is always some restless spirit among the great majority, and one of these has discovered that it is not necessary to go to Cariboo or even Goldstream to get the precious gold-bearing quartz, and the other day he recorded a claim on the rock off the battery at Finlayson's Point. His name is John Lundy, and he arrived here last spring from California. He has had a long experience in prospecting in California and Nevada and for the past month has been prospecting in the mountains off the Chemainus River. In April last he discovered a quartz ledge running from one side of the rocky point to the other, and disappearing into the sea. Staking out his claim on the legal length, he hired a couple of men to sink a shaft on one drift of the lode, which is about a foot in width. Spurs run out in several directions, but Lundy believes that when the shaft is down twenty-five or thirty feet the main ledge and color will be found. The shaft, as at present, is about 8 feet by 6, and shows a well-defined ledge of quartz to its full depth. In all of this there is plenty

of pyrites of iron, but nothing more. Still Lundy thinks that if the shaft was but sunk twenty or thirty feet further the precious metal would appear. About five feet down the quartz becomes of a bluer color and between the trap wall and the quartz is a drift of blue clay and slate, which the prospector informed the reporter was always a favorable sign, and he is very sanguine that gold would be found at the greater depth. He has expended about \$80 and his time in sinking the shaft so far, but like many another worthy prospector is now impecunious and wishes to form a company, to sink it deeper and thoroughly test the ledge. This would cost comparatively little, probably a couple of hundred, and in the event of the mine proving a valuable one, it would well repay the investment. It would be rather startling news if such should prove the case, and a mine of wealth have been under our feet and passed over thousands of times, and yet not known. The quartz can be readily examined by a trip to Beacon Hill.—*British Colonist, Victoria, B.C.*

BRITISH COLUMBIA MINING NOTES

The gold-diggings around Lillooet and Bridge river are returning fair wages. Miners in the Soda Creek vicinity are also getting some gold.

Prospectors have brought specimens of galena and a quantity of gold dust from Cowichan lake and river, and will return to further prospect the district.

An argentiferous galena claim has been rediscovered on the north fork of the Ille-cille-wat and recorded. Assays of the ore have given \$84 in silver to the ton.

What is supposed to be silver ore has been found in a ledge near Cowichan lake, and specimens have been forwarded for assay. Men are now engaged in sinking on the ledge.

The prospects for a successful season in the Kootenay district is said to be bright. There has been quite a rush to Fenley Creek. About forty Chinamen have gone up and have been taking out for \$1.50 to \$8 per day. It was expected that when the water subsided even better results would be had.

About twenty new claims have been located in the Semilkaween district, where recent gold discoveries have been made, and miners are reported to be taking out about \$3 to \$10 per day. The creek in which these discoveries have been made is a tributary of the Tulameen, and has been named *Granite creek*.

A mica mine, discovered last autumn, is being developed at Clearwater lake, between Big Bend and Cariboo districts. A trail has been cut to the mine and provisions and tools taken in. We are not informed if any quantity of mica has as yet been produced, but the quality is said to be very good.

More recent reports from Lorne Creek and Kitsum-Kaylum, are not encouraging. Miners are disappointed at the poor out-put, so far, this season. The *Discovery* claim, on Lorne Creek, after six days' washing, scarcely showed a colour; but better results are hoped for. Prospectors have made no new discoveries.

Other creeks in Lorne Creek district have been prospected and several claims staked out, on

some of which the ground yields as high as \$1 to the pan and averages well. It is, therefore, expected that the bed-rock will be very rich. It is rumoured that the miners have been earning \$1 a day from the gravel at Kitsum-Kaylum.

At Zerran mine, on Scotch creek, a tunnel has been driven forty-eight feet, and has entered a fine body of mineral. At fifty feet a cross-cut will be made to test the width of the vein, and a quantity of ore will be forwarded for mill test. An assay already made gave \$109.50 the ton, but the mill test is expected to prove the average richness of the vein.

Up to the beginning of July little has been done at the Lorne Creek placers on account of exceptionally high water, though some of the claims were being successfully worked. It is expected a great deal of fluming will be done this summer and some new ground has been paying well. The indications point to a large yield for the season from this creek.

Gold quartz has been discovered at the head of McCullough Creek, which flows southerly into Gold creek; the latter, a tributary of the Columbia, flows into that river about 50 miles above Farwell. The quartz, described as "rotten quartz," is said to be very rich, and free gold is visible to the naked eye. If there is any quantity of the quartz this is an important discovery.

A claim has been located at Leech River, within twenty miles of Victoria, which promises to become of importance. A careful examination of the ground gave many colours to the pan, and mining experts have pronounced the claim worthy of introducing hydraulic. Water can be brought from a lake a mile distant and paying results are predicted from these alluvial diggings if worked by the hydraulic system.

Thirty to forty miners are reported at work at Lake Kootenay, in galena ledges. Gold has been discovered on Slocan stream, a tributary to the Kootany river, about ten miles from its junction with the Columbia. Development of these claims will, however, be retarded, owing to the difficulty of access, which renders it impossible for prospectors to take in tools and other means wherewith to test their discoveries.

Specimens of galena from the strike near Shuswap Lake have assayed \$40 the ton and if expectations are borne out by further tests mining operations will be carried on extensively next year. Practical miners are of opinion that the ledge will be found to carry ore in fairly paying quantity. The vein is from seven to fourteen feet wide and has been traced for miles. If it can be proved that this ledge will pay, ample capital is available to work it.

No new discoveries have been made this year in the Cassiar district, and the old ones are said to be worked out, consequently, most of the miners have decamped. On McDame's creek there are about 28 white miners and about the same number of Chinamen. The Lorne claim is the only one on the creek where miners are encouraged, it is returning about \$10 a day per man. Thibert creek has about 25 miners at work on it, and Dease creek about 15. None of the claims on these two creeks are paying the miners more than their grub.

The mineral production of the United States is estimated at \$400,000,000 per annum and that of Great Britain at \$350,000,000.

UNITED STATES MINING NOTES.

Gold ore, worth no more than \$5 per ton, is being profitably worked in California.

The Tamarack Company's combination shaft has reached the great Calumet & Hecla ore-bed at a depth of 2,260 feet.

The dividends paid by mining corporations in the United States for the first five months of the year aggregated \$2,114,030.

The ordinary yield of the gravel channels in the northern counties of California is from \$40,000 to \$50,000 per acre.

The gold production of the United States in 1884, was equivalent to 1,789,949 troy ounces; and the silver to 37,744,605 troy ounces.

The net product of the 20 stamp mill of the Granite Mountain mine of Montana since December 1, 1884, to July 22, was \$718,927.63.

The following is the June output of the copper mines of Lake Superior as far as reported: Calumet and Hecla, 2,576 tons; Quincy, 270; Atlantic, 212; Franklin, 190; Huron, 115.

From January 1, 1885, to August 8, the output of anthracite coal was 16,724,560 tons, as compared with 17,459,917 tons for the like period of last year, showing a decrease of 735,357 tons.

The production of copper in the United States in 1884, including 2,858,754 pounds made from imported pyrites, was 145,221,934 pounds, worth \$17,788,687, at an average price of 12½ cents per pound.

News has been received from Alaska that the new 120-stamp mill at the Treadwell mine, on Douglas Island, was placed in position in June last, and that the first month's receipts amounted to \$100,000. This is the largest quartz mill on the continent, and was erected at heavy expense and under many disadvantages, in that out-of-the-way country. It was expected that \$250,000 would be recorded for the second month's mill-run, and as the expense of mining is not more than 20 per cent. of the proceeds, there is every indication the mill will prove a very valuable investment.

Plymouth Consolidated Gold Mine.

The product of this dividend-paying property for June is reported officially at \$82,656.70 making the product for the six months ending with 30th June, \$493,607.65 or a monthly average of \$82,267.94. The operating expenses of property aggregated \$160,792.84 for the six months, being a monthly average of \$26,799. The profit of the half year was \$332,814.81, which added to cash left over on 1st of January, 1885, made the sum disposable for dividends \$407,109.87. The six dividends paid this year aggregating \$300,000, together with \$10,914.86 expended in constructions, left a cash balance of \$96,195,000 on the 1st of July, or \$46,195 after the dividend of the 9th of July was paid. The stockholders of this company have already received \$13 per share in the form of dividends.

Production of the precious metals in Mexico since 1493 amounts to almost \$3,000,000,000, or about \$1,000,000,000 for each century.

Deep Mining in Australia.

The ten deepest shafts in Victoria on the 31st March were: 1. Magdala Company, Stawell, 2,409 feet; 2. Lansell's 180 mine, Sandhurst, 2,041 feet; 3. Victory and Pandora Company, Sandhurst, 2,000 feet; 4. Newington Company, Pleasant Creek, 1,940 feet; 5. Prince Patrick Company, Pleasant Creek, 1,830 feet; 6. Crown Cross United Company, Pleasant Creek, 1,815 feet; 7. Prince Albert Company, Pleasant Creek, 1,770 feet; 8. North Old Chum Company, Sandhurst, 1,684 feet; 9. Oriental Company, Pleasant Creek, 1,676 feet; 10. New Chum and Victoria Company, Sandhurst, 1,625 feet. Only two of these shafts were deepened during the quarter, viz.: that of the Victory and Pandora Company by 60 feet, and that of the North Old Chum Company by 20 feet.

Gold Product of Victoria.

While the aggregate product of gold of the Australian colony of Victoria for the first quarter of 1885 was less than last year for the same quarter and aggregated but \$3,848,000, we observe that these same Victoria mines have paid during the quarter at least \$1,056,995 in dividends or, according to districts, as follows:—

Ballarat	\$ 410,950
Beechworth	6,280
Sandhurst	405,565
Maryborough	32,555
Castlemaine	81,100
Ararat	13,745
Gipps Land	106,800

Total

—Financial and Mining Record, N. Y.

Jordan's Patent Pulverizing Machine.

This is an appliance recently exhibited in London by the engineering and manufacturing firm of T. B. Jordan, Sons, & Commans, London, of which the London *Mining Journal* gives the following description:

"Jordan's patent pulverizing machine for the reduction of hard or tough substances, such as ores, emery, quartz, flint, coprolites, paint materials, cereals, etc., to a fine powder, is a machine that will meet the requirements of mining engineers and manufacturers. This pulverizer is a massive cast iron casing, inside which beaters revolve in opposite directions at great velocity; the faces of the beaters are so angled as to prevent the material to be pulverized flying against the casing, and so as to strike it to and fro from the path of one set of beaters into that of the other. The material falls from the automatic feeder into the crushing casing and is beaten by impact into any fineness required. The pulverized material is carried away by a current of air induced through the machine by vans on revolving beaters. The force of the air current can be regulated by valves, and delivers the material when reduced into a collecting chamber in any required fineness, from 30 to 120 mesh. From thence the material is drawn off at will or delivered automatically. The machine is simple and very effective, and subject to little wear and tear. No grates or sieves used, and may be pronounced an admirable machine."

The same firm also exhibits, a "Dry Gold Amalgamator," to be worked in connection with the pulverizer, and for extracting the gold from the pulverized ores in a dry state. This amalgamator consists of a cast iron cylinder about 3 feet 6 inches in depth, in the centre of which works a revolving iron tube which works inside a larger tube revolving in an opposite direction; the powdered gold ore is fed into a hopper at

the top of the centre tube. Mercury is kept in the amalgamator in such quantity that there is a vertical height of about 30 inches of the liquid metal in the outer tube when the inner tube by its rotation is centrifugally emptied of mercury. Its rapid upward progress through the mercury is counteracted by a set of revolving blades, which keeps it agitated and separated in the mercury. On rising to the top of the column of mercury, a blast of air blows the ore along a pipe to waste pits or settling chambers as desired. The dry powdered ore having to pass through this column of mercury in a separated condition causes the finest particles of gold to come in contact with it and thus perfect amalgamation ensues. To show the superiority of this machine over those in ordinary use, it is reported that quantities of pyriteous ores, containing 4 ozs. 8 dwts. per ton was put through the apparatus with the result that only 4 dwts. 20 grs. of gold were left in the tailings, showing that 96 per cent. of the gold had been taken out, and in dealing with various descriptions of the refractory ores, from 92 per cent. to 98 per cent. of the gold has been extracted. These machines and the pulverizers are likely to come into great use in future gold mining operations.

They also have a Hydraulic Amalgamator for the amalgamation of free gold. Consists of a hollow column set in a cylindrical basin or muller revolving within another fixed basin charged with mercury, the slime or tailings from the mills are conducted into the hopper on the top of the shaft which is caused to revolve at about 30 to 40 revolutions per minute; the pressure in the column, about 10 feet, causes the material to pass through the mercury which is kept agitated and bright by the rotatory motion, the slime rising over the edge of the outer basin is discharged.

Large Casting in Italy.

The largest casting ever attempted in Italy was successfully accomplished at the ironworks of Signor Gregorini, of Levere, on the Lake of Isao, Lombardy. The colossal block of cast iron, measuring 14 cubic metres (494.43 cubic feet), and weighing 107 tons (105 English tons), is intended for the anvil of a 10-ton steam-hammer now being constructed for the Royal Arsenal of Spezia. The operation occupied twenty-three hours.

The World's Production and Consumption of Copper.

At a recent meeting of the shareholders of the Arizona Copper Company, held in London, England, Mr. G. Auldjo Jamieson gave a comparative summary of the world's production and consumption of copper, as follows:—

"The production of copper for the year 1879 was 149,000 tons all over the world; in 1883 it was 193,000 tons. In those years the production of copper had increased 11 per cent.—no very great increase after all, compared with the enormous increases during preceding and longer periods. The consumption of copper in England and France in 1883 was 94,334 tons, and in 1884 it was 107,143 tons—an increase in one year of 13 per cent. So that measured by these figures they had come up at last to this point, that the consumption of England and France—two by far the most important of the consuming countries—had outstripped the rate of increase in the supply. In the United States in 1883 the consumption was 58,000,000 pounds, and in 1884 it was nearly 96,000,000—an increase of 8,000,000 pounds. On January 1st, last year, the price of copper

was \$290 a ton and the stock visible and in hand, was 40,186 tons. On December 31st last, the price was \$236 a ton, but the stock on hand was only 36,638 tons. There took place during the year 18 per cent. of a fall in prices and 812 per cent. of a fall of the visible stock on hand. America, with which they were mostly concerned, had in 1880 to import its copper largely from Chili. In 1882 it exported 745 tons to England; in 1883 it exported to England 9,410 tons; and in 1884 it exported to England 17,309 tons. So that from 1880 when it was importing copper, there had been a rise from a negative quantity to a positive exportation of over 17,000 tons. The question was—Is consumption come up to the level of and is it likely to outstrip production? On these matters he could offer no observations that would be worthy of their consideration; but it was his duty to observe what was said by those whose authority carried weight. In the report of the most authoritative of the metal brokers in London, this statement was made in the end of 1884:—'We are apt to undervalue the fact that although the demand for electricity is still behind hand, we have nevertheless absorbed and more than absorbed all available supplies. Indications of the copper wealth of the world increased, but the cost of mining is not to be judged from sensational newspaper articles; and there are important sources of supply where not only will exploration cease, but actual production must be killed by present values. Isolated mines may be able to give us copper at a fabulously low price, but they may grievously mislead us as to the average cost of production; and if a little more hopeful feeling springs up, if sentiment which has throughout the year been against all markets, turn in their favor, we may a year hence look back on the value of copper to-day as a momentary depression at variance both with former experience and with the present circumstances of the consumption.'"

Minerals Found with Gold in New South Wales.

The most common minerals that are found with vein gold are iron pyrites, which is never quite free from gold, and is sometimes exceedingly rich in it; iron oxide, which is for the most part derived from the decomposition of various pyrites; mispickel, in calcite, as at Lucknow, where the mispickel contains in parts over 2,000 ounces of gold per ton; also in calcite, at the Crow Mountains, Barraba, at Lake Cowal; at Humberg Creek; at Grenfell; at Solferino, in the Garibaldi Reef; at Merimbula; and also, it is stated, near Gunnedah. With mispickel at Carcoar, and at Moruya with silver sulphides also; with pyrrhotine and calcite, as at Hawkins Hill; with galena and zinblend at Grenfell; with galena, zinblend, magnetite, molybdenite, chlorite, and scheelite at the Williams mine, Adelong; talc, asbestos, and serpentine, near Gundagai; steatite, cuprite, malachite, tenorite and other copper ores, notably in the Canobolas and in the Winterton mine, Mitchell's Creek, near Bathurst, where it is also associated with barytes in well-developed although small crystals, and with mimetite, a chloro-arsenate of lead; it is also found with mimetite in the Adelong district; it is reported with tinstone in the cliffs at Eden, and with native arsenic at Solferino. Beautiful specimens of native gold, in malachite and red oxide of copper, have been yielded by the Kaiser mine, Mitchell's Creek, near Bathurst. Gold and native copper have been found together in quartz veins, and in the rocks through which

the veins pass. In alluvial deposits, gold is associated in New South Wales with a very large number of minerals; and it is remarkable that certain of them, such as platinum, osmium, sapphire, ruby, oriental emerald, and diamond have not yet been found *in situ*. Among other minerals, we have tinstone, titaniferous iron, magnetic iron, chrome iron, brookite, rutile, anatase, emerald, beryl, topaz, zircon, hyacinth, spinel, garnet, red and brown hematite, pyrites, binocide of manganese, galena, blende, tourmaline, magnesite, and many more of less value.—(*E. and M. Journal, N.Y.*)

The Deepest Mines Known.

The deepest mine, according to Humboldt, is an abandoned one at Kuttenburg, in Bohemia, where the lowest part of the mine is 629.33 fathoms deep. A staple which had been sunk from the workings of the colliery Des Viriers, at Gilly, in Province of Hainault, in Belgium, had attained the depth of 581.5 fathoms. The Adelbert mine, in the Prizibam district, in Austria, has a shaft 546.5 fathoms deep, according to M. M. Jars and Duhamel. An abandoned argentiferous copper mine, at Kutzy Puhl, near Innsbruck, in Tyrol attained a depth of 546.83 fathoms. The Sampson silver lead mine, at Andreasburg, in the Hartz mountains of Germany, is 468.66 fathoms deep. The Rosebridge colliery, at or near Wigan, Lancashire, England, is 403 fathoms deep. In the Zwicken district, in Saxony, coal is drawn from a depth of 434.5 fathoms. Duckinfield coal mine, in Cheshire, is 358.5 fathoms. At the Dolcoath tin mine, in Cornwall, the engine shaft is 350 fathoms. The Wheal Vor, a tin mine in Cornwall, containing rock kilas, in 1859 was 321 fathoms deep. A silver mine in the Konsberg district, in Norway, is 311.5 fathoms deep. The Wheal Mary Ann, a lead mine in Cornwall, is 300 fathoms deep. The Camphausen coal mine, in the Saarbrück district, in Prussia, is 275 fathoms deep. Ince Hall coal mine, Lancashire, is 300 fathoms; Worthington coal mine, Lancashire, is 300 fathoms; Ryhope coal mine, County Durham, is 271 fathoms; Renard coal mine, Anzin mines, France, is 272 fathoms; Pendleton coal mine, Lancashire, is 363.5 fathoms; Douglas Bank coal mine, Lancashire, is 262 fathoms.—JAMES V. MURPHY, in *National Labor Tribune*.

ASPHALT.

In about the centre of the island of Trinidad, just off the coast of Venezuela, there is an asphalt lake. It is said to cover about one hundred acres and is apparently inexhaustible. It is a black, sandy substance, and is believed to be crude rotten petroleum. A singular feature of the substance is that, although about fifty thousand tons are taken out of this lake annually, it constantly fills up so that there is no lessening of the supply. This singular lake of paving material is owned by the Venezuelan government, but leased to a company in Washington.

A lump of coal brought from the Victoria, Sydney, C.B., mines, is three feet five inches in height, nineteen inches wide, fifteen inches thick and weighs 400 pounds.

The returns relating to gold mining in the colony of Victoria for the first quarter of 1885, show a falling off in the yield to the extent of 8,351 oz. 4 dwts. 22 grs. compared with the preceding three months.

Gold Mining Simplified.

A somewhat incredible gold story has appeared in the U. S. *Press* to the effect that Mr. Bob Paul, of Township No. 10, Cabarrus county, N.C., went to the Charlotte mint for the purpose of having his gold dust coined, and told this tale:

"On my farm is an old gold pit that was dug by an English miner, as tradition says, during the revolutionary war. The same authority says that this miner took \$15,000 from this pit in gold, and being satisfied with his wealth, abandoned the pit and went back home, leaving the mine full of rich ore. The people of the neighborhood worked the mine at different times, but it was finally neglected and forgotten. Weeds grew up around it, and the rains partly filled up the excavation. During the past winter I was troubled with mud in my front yard, and at the suggestion of my wife I went and hauled three cart loads of sand and gravel from the old pit-hole and scattered it over the yard. Last Monday, while walking over the gravel, I noticed a glittering object, and on picking it up I found that I had a nugget of virgin gold, weighing an ounce. I examined further, and the sand and gravel proved to be rich in gold. I carted the three loads to a branch near by, and 'panned out' gold valued at \$325. I then went to the mound taken from the pit, and got a bushel of the ore and pounded it to dust in a mortar, and obtained gold to the amount of \$125."

After hearing the story and seeing the \$500 in gold, Mr. Eli Hinson, a wealthy citizen of Mecklenburg county, offered Mr. Paul \$50 a bushel for the 2,000 bushels of sand and gravel lying at the mouth of the pit-hole. The offer was promptly refused. The story about the Englishman is said to be true by a doctor 50 years old, who lives near Mr. Paul. Experts have gone into the mine, and a full supply of modern machinery will be put in.

On a Possible Genesis of the Canadian Apatite.

By G. HENRY KINAHAN, M.R.I.A., &c.

(Read before the Geological Society of Manchester.)
Continued from page 11, Vol. 3, No. 4.

In the S.W. of Galway and the S.W. of Mayo these rocks also occur (*Lettermullen and Croaghpatrick beds*); but in these places the bands are of less width, while the rocks are not as well exposed; those seen are, however, more similar to the Canadian rocks, being more altered.

There are also in West Galway two other bands of more or less similar rocks; one, the younger (highest strata in the *Great Micalyte series*), being the uppermost member of the group of rocks that appear to be the equivalents of the Arenig rocks (Upper Cambrian) of Wales; while the older is a group in the supposed Lower Cambrian (*Ophiolyte* and *Dolomyte series*). In the latter there are some peculiar calcereous or allied rocks, exactly similar to some of those met with in the vales of the Du Lièvre and the Gâtineau. In the Co. Donegal there are also similar bands, but of even less widths; they, however, are interesting on account of the rocks in them. The exact age of these is not yet satisfactorily worked out, but in the "Geology of Ireland" it is suggested that they are probably of Cambrian or Cambro-silurian age.

Certain limestones and dolomytes, in these groups of rocks in S.E. Ireland, Galway, Mayo and Donegal, also in other Irish localities that need not now be specially enumerated, are very curious, entangled in, and associated with, basic

eruptive rocks [*Gabbro, Granitone, Euryte* (Daubuisson) or *Hybrid rocks* (Durocher) and allied rocks], also with quartzites or greissens (*quartz rock* or *reef quartz*). This connection of calcic and calcereous rocks with eruptive rocks induced me some years ago to suggest that they were probably adjuncts of vulcanicity (*Geology of Ireland, chap. XII. and XIII., and prior papers*); while, since then, subsequent explorations seem to add strength to the suggestion, as rocks of these kinds occur in such intimate relations to eruptive rocks that they could not be ordinary sedimentary accumulations, but must have come into their present position in solution, or have been injected therein; the first, however, is more probable than the last.

The similitude between the Irish association of rocks, if the limestone was replaced by apatite, and those in the vale of the Du Lièvre forcibly presented itself when the latter was first seen, while subsequently, examination strengthened it.* An examination of the "back" of the lodes and bunches exhibited a color similar to that of rocks which, in Ireland, give indication of the presence of phosphoric acid, although in some cases very faint. This seems to suggest, considering the relative state of the rocks, those of Canada being more metamorphosed than the Irish ones, that there might be an affinity between them; while further examination and consideration appear to strengthen the impression.†

It should also be mentioned that in some of the Irish eruptive rocks, which apparently belong to those called *Euryte* by Daubuisson or the *Hybrid rocks* of Durocher; there seems to be small quantities or traces of phosphoric acid.‡ This appears to be an important consideration, as will be presently mentioned.

The inquiry in connection with the home rocks is as yet far from being complete. After I learned the "gossan colour" of the apatites, which was previous to my going to Canada, I have not had an opportunity of examining any but submetaphoric rocks, in which the pyroxene is little if at all changed; while according to the researches of G. H. Williams, of Baltimore, in the associated eruptive rocks of the apatites of the vale of the Du Lièvre, and also in Scandinavia there is a paramorphoses of the pyroxene and the felspar, the first "being more or less changed into hornblende and the latter into wernerite." Nevertheless, the home researches, up to the present, appear to suggest that in the Irish submetaphoric rocks there has been a limited paramorphoses of limestone into apatite.

From what has been observed in Canada and in Ireland, I would venture to suggest that *it is possible the present Canadian apatites were originally limestone or allied rocks, the change to apatite being due to paramorphoses, which at present cannot be satisfactorily explained.* Such a suggestion seems allowable, when we consider that the paramorphoses of pyroxene, into hornblende, although known to take place, cannot as yet be explained. An objection that may be raised is,—Where did the phosphoric acid come from? If, however, it can be satisfactorily proved that in some or many of the

* Regular lodes of dolomyte and calcite occur in Irish eruptive rocks; also veins of bastard limestones, with one wall merging at the other side into the country rock,—such lodes and half-lodes that I call to remembrance are, however, mere bagatelle to the Canadian lodes of apatite.

† Phosphoric acid in small quantities is frequently found by chemists in limestones and dolomytes. It would, however, be necessary to know the exact localities where such limestones and dolomytes came from in order to determine whether the rocks were an ordinary deposit or subsequently partially altered. This is an important point; as unless special localities where such apatite limestone came from is known, they ought not to be brought in as evidence "that many limestones contain apatite."

‡ These rocks weather with a partial gossan color of the Canadian apatite.

unaltered Irish eurytes this acid is present, this objection would in a great measure be answered. Because if in the Irish assembly of sub-metamorphic rocks there are found phosphoric eruptive rocks and limestones associated, while in the Canadian metamorphic rocks apatite and non-phosphoric eruptive rocks are similarly related, it may be supposed that the additional action to which the latter were subjected was such as to allow the phosphoric acid to replace the carbonic acid.

In addition to the similitude between the form and occurrence of the limestone and apatite, there are other circumstances that may add weight to the previous suggestion, besides showing that other characteristic minerals of Canadian Archaean Rocks may be also the products of metamorphic action. Not however to excessive metamorphism, that is, an excessive change that took place at one time, or in one period of time; but to successive alterations, due to periods of metamorphic action, with intervals of greater or less duration between each. Rocks of such a great age as the Laurentian should necessarily be subjected to such vicissitudes; as during the lapse of time since they were first accumulated, they must sometimes have been at great depths below the surface of the earth, while at other times they were at or near it; therefore it appears safe to conjecture that the change they underwent during the first period of metamorphic action was subsequently augmented by the action of latter periods. Artificially, graphite can be produced by heat, so also can specular iron ore; if therefore in the Canadian rock, when submetamorphic, there were graphitytes, pyritilytes, pyrrhotilytes, with feriferous limestones, and schists, as found in the Irish rocks, there would have been rocks that, by subsequent alteration, should change into the graphite-schist and other graphite producing rocks, the "specular schist" and other iron ores; while it might be also suggested that the metamorphoses of pegmatyte would further develop its minerals, and by concentration increase the size of each individual mineral; thereby accounting for the great size of the crystal of mica and other constituents of the Archaean pegmatytes.

It may appear presumptuous in a person, not a chemist, to put forward some of the above suggestions, still, as during the last six or eight years I have been studying the possible or probable genesis of apatite, they may be excusable. Besides, from my knowledge of Irish rocks, and also of rocks in a few English and Scotch localities, I suspect, now that special attention is directed to the subject, that apatitic rocks will be discovered in different localities; nor would I be surprised if some of them were of commercial value.

In the Atlantic States, from Maine to Virginia, 65,000 long tons of land plaster and 60,000 tons of stucco, total 125,000, were made in 1884, of which nearly all was from Nova Scotia gypsum.

The Austrian product of the money metals for the calendar year, 1884, was as follows: Gold, \$15,670, and silver, \$1,267,142. This is a somewhat larger product of both metals than that of 1883. The gold product of Hungary is not included.

A Russian Expert Expedition.—The Russian government proposes sending experts to Turkistan, to study the turquois mines on the Persian frontier. The same commission will visit the sulphur deposits recently discovered near Khiva, and the lignite mines and petroleum springs in the district of Ferghana.

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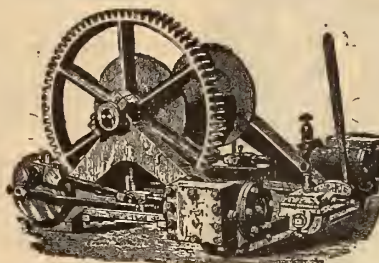
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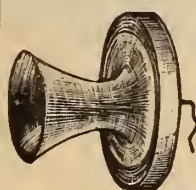
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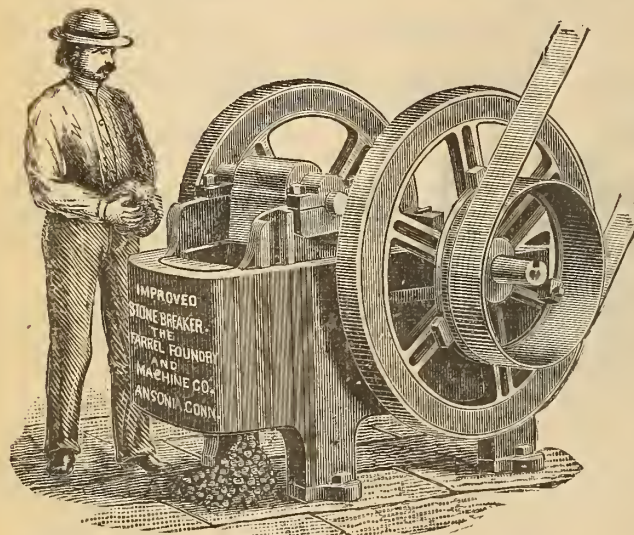
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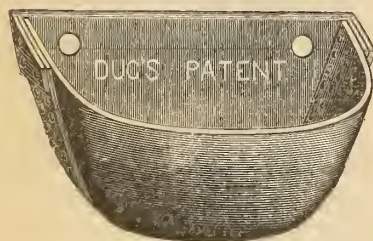
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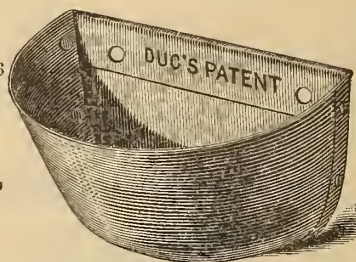
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Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 20th of the month.

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In the money centres of the world the mining industry is beginning to be regarded with more favor than it has been for years past, and the time is now opportune to say a word to prospectors and owners of mining claims who, we deem it, are much in need of a little friendly advice. We do not feel that we can advise more forcibly, or place before our readers the relative positions of mines and capital in a more common-sense light than by quoting from the editorial columns of the *Chicago Mining Review* whose editor appears to take in the present situation and to realize the value of capital, its necessity to the development of mining industries the world over, and the price that must be paid for it. He says:—

"It is admitted on all sides that lack of capital is one of the greatest needs of thousands of localities where there is undoubted evidence of satisfactory ore bodies; hence it is certainly most unwise to place such exorbitant prices upon mere prospects, which will require the expenditure of thousands of dollars to make of them producing and profitable mines, that capitalists seeking investment turn away and put their money into more inviting fields.

The great demand for the establishment and vindication of the mining industry now is production. This can only come from mines, never from prospects. Hundreds of localities are rich in the most promising prospects but they add no tangible evidence of value to the district, which in many instances is practically deserted. These prospects, which represent an investment of labor, enormous in the aggregate, will never become mines, never add anything to the wealth of the

country, or reimburse those who have given so much to them, without capital.

The millions in sight are not so attractive when the cost of turning them into a marketable commodity has been thoroughly demonstrated. The rich veins of high grade mineral that the prospectors' toilsome shaft has revealed, requires long and costly expenditure of well directed capital before its value can be changed into money.

A critical time is approaching in the history of our mining industry, and the question of its future is largely in the hands of miners and prospectors. The existence of immense mineral resources of wonderful extent and variety has been fully demonstrated and confirmed, but the permanent and regular production depends upon extensive operations requiring large expenditure of capital. Those holding claims must, therefore, form a new standard of value, based more nearly upon the cost of acquisition and less upon the estimated value of the unknown probabilities at a cash price, allowing nothing for cost of producing; otherwise the surplus idle capital which is flooding every money centre, will seek other channels and follow them."

We give an account elsewhere of what is being done at some of the more important mining locations in the silver district on the north shore of Lake Superior. We will be glad to receive some statistical information concerning the working of these properties; such as, the number of men employed, the amount of capital invested, what machinery has been erected, and the estimated value of the ore that has been raised on each location. In addition to the very encouraging reports of progress that reach us regularly, statistical information would be of much interest to our readers.

We are indebted to Professor Wm. Boyd Dawkins for a copy of a lecture, in pamphlet form, entitled "Canada and the Great North-West," delivered by that celebrated gentleman at the Salford Town Hall on 28th April last. Professor Dawkins in the course of his lecture, after referring to the important lumbering interests of the Ottawa district, drew attention to our phosphate industry in the following words:

"Another point in regard to Ottawa is that there exist in the neighborhood valuable deposits of phosphate of lime (apatite), in which a large and important trade is being developed. It was not a little interesting to me to go some distance up one of the wonderful rivers, which form the highway in that part of the world, and examine some of the phosphate mines near Buckingham; and it was still more interesting to me to see the same material in process of manufacture at Widnes, in Lancashire. There is an important trade between this district and the mineral districts of Ottawa."

The extent of the gold fields of Nova Scotia is not, generally known. They

stretch along the Atlantic coast from Yarmouth to the Straits of Canso, varying in width from 10 to 40 miles, and cover an area of about 7,000 square miles. Gold was not discovered in the province until 1838, although Sir Charles Lyell proclaimed its presence in 1842. Some of the mines have proved very rich. The most prosperous operations in the province are now being carried on by the New Albion Company at their Montague mines in Halifax county. What is needed for the development of other mines is more capital. The production of all the gold mines in Nova Scotia in 1884 amounted to 16,059 oz., 18 dwts., 17 grs., being an average of \$2.40 per day, per man.

In another column will be found some facts in connection with alluvial gold mining on Slate Creek, in Beauce. Latest news from the St. Onge Company's mines is very satisfactory and proves that we were not astray in our predictions of a year ago. All obstacles have now been overcome, and as a reward for the labor that has been expended this company have the intense satisfaction of seeing coarse gold and large nuggets being washed from the gravel at the bottom of the shaft in sufficient quantity to pay handsomely, and yet they are one hundred feet from the middle of the river bed.

We have learned with much gratification that the grand jury of the Antwerp International Exhibition has awarded a silver medal to Mr. W. A. Allan, of this city, for his exhibit of Canadian Apatite and Mica. The official document conveying this order of merit was received from the Belgian authorities by Sir Charles Tupper, High Commissioner in London, and transmitted by him to the Government of Canada, with his personal congratulations upon the award.

Mr. Eugene Coste, M.E., Mining Geologist of the Geological Survey, is at present in the Lake Superior gold and silver district. Mr. Coste's recognized ability as a mining engineer makes his visit to the North Shore district a matter of much interest, and as his opinion of the mines will be awaited with eagerness, it is to be hoped that his report will be made public without unnecessary delay.

Mr. W. de L. Benedict, M.E., of New York, is making a flying trip, professionally, to the Black Hills, Dakota, in the interest of New York capitalists. Mr. Benedict has identified himself with the mineral resources of Canada, particularly the phosphate industry, and is capable of giving a professional report on mining properties from a business standpoint as well as scientifically.

Mr. J. Obalski, M.E., under instructions from the Quebec Government, has begun an inspection of the phosphate lands in Ottawa county. Mr. Obalski is the government Mining Engineer and his report will be looked for with much interest.

THE PHOSPHATE TRADE.

One of the greatest industries in Canada today, and the one that is developing most rapidly, is phosphate mining. The product of our mines is attracting the attention of all the fertilizer markets of the world, and is now more sought after than at any period since the mines were opened and Canadian apatite was offered to manufacturers of super-phosphate. So far, this season, England, Scotland and Germany have taken the entire output of our mines, but it is not unlikely that direct shipments will be made to France next year and that the United States will demand a certain supply. Our phosphate trade, it may be said, is now on a firm basis, though in some respects producers are yet dissatisfied with the system in vogue for the disposition of the product of their mines, but as this great industry is only now in its infancy, it will be found, no doubt, that as the annual output of the mines increases and producers become more experienced in dealing with the various markets where their trade lies, a satisfactory custom, governing purchase and sale, will be arrived at.

The number of visitors to the mines in the Lièvre river district is steadily increasing. During the months of August and September a number of English and American mining engineers and capitalists passed over the district and critically inspected some of the mines that were most developed and would give them an idea of the permanent character of the deposits. The *Emerald*, *Little Rapids*, *North Star*, *High Rock* and the *Union Company's* mines did much to open their eyes to the vast proportions of the phosphate beds and veins and the enormous production of which these mines are capable. Of the deposits the visitors have nothing to say except in terms of the highest praise, but many of them have expressed some doubt as to whether the system of mining now followed is the correct one. As phosphate mining is a comparatively new industry in Canada, and as similar deposits are not elsewhere found, we can only look to experience to teach us how our mines can be worked to best advantage and the output raised and dressed most profitably. Mine owners appear to have given a good deal of attention to these important considerations during the past three years, and many radical changes and improvements have been introduced with most satisfactory results.

It will be seen by our statement of shipments for the month of September that 17,853 tons of phosphate had gone forward this season up to date. There is now at the mines and shipping points several thousand tons awaiting transportation, a great portion of which will go forward before the close of navigation.

The mines are giving employment to a large number of men and are yielding a steady output of ore. Among the most productive are the *Emerald*, *North Star*, *High Rock* and *Union Company's* mines. These employ a force aggregating 338 men, and their joint output for the month of September reached 2,285 tons, distributed as follows:—*Emerald*, 75 men, 780 tons; *North Star*, 70 men, 580 tons; *High Rock*, 115 men, 565 tons; *Union Company*, 78 men, 360 tons. This output for the four mines as compared with August shows a slight falling off, which is accounted for by there having been a considerable amount of dead work done.

Other mines throughout the phosphate district are being steadily worked and are contributing their quota to the year's production. Several new properties have been opened within recent date, notably the *Cold Hill* mine in the

Gore of Templeton, the *Lily* and the *Glasgow* Canadian Phosphate Company's mine in the Township of Derry, all of which are said to be developing very satisfactorily, but we have received no particulars of progress.

At the *Little Rapids* mine there is a fine showing of ore in the veins that have been opened up and other veins are being vigorously prospected on the property. This mine has been highly spoken of by every one who has visited it, and especially by Dr. T. Sterry Hunt, who has pronounced it to be as valuable a property as any that has been yet discovered in Canada. He says of it that with a proper force of miners the *Little Rapids* mine is capable of yielding high grade ore as abundantly as any one of the heavy producers in the phosphate district.

The Phosphate of Lime Company are opening up lot No. 2, in 1st range of Portland, and it is said to be developing satisfactorily. This same company are constructing a tramway from their High Rock mine to the Lièvre River and expect to have it completed about the middle of November.

Mr. G. H. Bacon has completed his mill at the Basin du Lièvre and will now proceed to grind phosphate. The progress of this new industry will be watched with much interest.

Phosphate Quotations.

There has been no variation during the month in prices. We quoted 1s. $\frac{1}{2}$ d. for 75 per cent. in August, which we find, by report of sales during that month, was $\frac{1}{2}$ d. a unit higher than the market ruled. The market is now firm at 1s. for 75 per cent., a fifth of a penny rise, ex-ship London and Liverpool.

Ocean Freight.

Steamship rates, from Montreal to Liverpool and London, are now at 6 to 7 shillings per ton. Seven shillings is the highest reported to us for September.

PHOSPHATE SHIPMENTS FROM MONTREAL FOR SEPTEMBER.

Date.	Vessel.	Destinat'n.	Shippers or Agens.	Tons.
Aug. 26	S.S. Barcelona.	London.	Lomer, Rohr & Co.	282
31	S.S. Oxenholme.	Liverpool.	Wilson & Green.	715
Sept. 1	S.S. Carmora.	London.	Lomer, Rohr & Co.	195
" 1	S.S. Carmora.	London.	Irwin & Hopper.	22
" 4	S.S. Escalona.	Bristol.	Lomer, Rohr & Co.	273
" 4	S.S. Scotland.	London.	Lomer, Rohr & Co.	155
" 5	S.S. Juliet.	London.	Wilson & Green.	178
" 12	S.S. Mayo.	Liverpool.	Wilson & Green.	100
" 18	S.S. Benhope.	Liverpool.	Millar & Co.	118
" 22	S.S. Benona.	Barrow.	Millar & Co.	190
" 23	S.S. Colina.	Glasgow.	Lomer, Rohr & Co.	275
" 24	S.S. Marciano.	Liverpool.	Wilson & Green.	525
" 30	S.S. L. Superior.	Liverpool.	Wilson & Green.	156
" 30	S.S. L. Superior.	Liverpool.	Wilson & Green.	79
Total for September.....				3,263
Previously reported				14,590
Total to September 30th.....				17,853

The Phosphate Industry of South Carolina

It will be interesting to many of our readers to know how vastly phosphate mining has increased in importance in South Carolina during the past fifteen years, and we therefore give some facts and figures from which they may form an idea of the proportions to which this industry may attain in Canada when her phosphate belt has been more extensively opened and the mines developed.

The following report, forwarded to us from Charleston, S. C., gives the history of phosphate mining in that State:

"South Carolina has been wonderfully enriched by this extensive industry, which, in

connection with the manipulation of phosphates, it is estimated by the State Agricultural Department, has brought \$50,000,000 into that State since 1868. There are at present in operation in the State 14 companies engaged in mining phosphate on land, 11 river mining companies, and 11 fertilizer manufacturing companies. There have been mined and shipped, from 1868 to 1884, 2,699,000 tons of phosphate rock, equivalent to about \$16,000,000; there have been manufactured from 1871 to 1884, 2,000,000 tons of fertilizers, equivalent to about \$34,000,000, giving a total of \$50,000,000, which has been brought into the State by the phosphate industry in the last 17 years. Of this amount the State has received as revenue \$1,200,000, which was paid as royalty, besides the heavy taxes levied on the products of the land companies and fertilizer manufacturers. The production of phosphates for 1884 was 409,000 tons of rock and 236,884 tons of fertilizers.

In 1880, according to the United States census, there were 28 fertilizer companies in South Carolina, having an aggregate capital of \$3,993,300. In the amount of capital invested in this industry South Carolina stood second in the list of States. Maryland ranking first, with a capital in fertilizer manufacture of \$4,271,870, or not quite \$300,000 more than South Carolina. The third State on the list was New York, which had over \$1,000,000 less employed in the manufacture of fertilizers than South Carolina. In the number of hands employed South Carolina ranked first, having more than twice as many engaged in the fertilizer industry as Maryland, and nearly three times as many as New York.

Since 1880 there has been a rapid development of this important industry in South Carolina, as may be readily seen from the fact that in that year only 190,000 tons of phosphate rock were mined; while in 1884 the amount was 409,000 tons, or largely more than double. The increase since 1880 has been steady, the amount mined in 1881 being 265,000 tons; in 1882, 330,000 tons; in 1883, 355,000 tons; and in 1884, 409,000 tons.

The total amount of phosphate rock mined in South Carolina since the discovery of these deposits has been as follows:

YEARS.	TONS.
1868-70	20,000
1871	50,000
1872	60,000
1873	90,000
1874	100,000
1875	115,000
1876	135,000
1877	165,000
1878	210,000
1879	200,000
1880	190,000
1881	265,000
1882	330,000
1883	355,000
1884	409,000
Total	2,699,000

Of this amount there was—	
Of river rock.....	1,229,170
Of land rock	1,469,830
Total	2,699,000

Of this amount, 1,359,000 tons, or more than one half, has been mined during the last four years.

As already stated, the aggregate capital invested in the manufacture of fertilizers in South Carolina in 1880 was \$3,493,300. At the present time over \$6,500,000 is actually invested in this industry. This, of course, does not include the unpaid capital stock of incorporated

companies, but only the actual investments in money.

The list of phosphate mining and manufacturing companies, not including several companies engaged in manufacturing fertilizers from cotton seed, is as follows:

Name.	Location.	Capital.
Hammond, Hull & Co., Beaufort		\$
Hume Bros., & Co., limited, Beaufort		500,000
Phosphate Mining Co., Beaufort		250,000
Sea Island Chemical Co., Beaufort		500,000
Ashpoo Phosphate Co., Charleston		50,000
Ashley Phosphate Co., Charleston		100,000
Atlantic Phosphate Co., Charleston		200,000
Bolton Mines (Wyllie & Gordon), Charleston		
Charleston Mining and Manufacturing Co., Charleston		1,000,000
Coosaw Mining Co., Charleston		125,000
C. H. Drayton & Co., Charleston		
Edisto Phosphate Co., Charleston		200,000
Etiwan Phosphate Co., Charleston		300,000
Julius Fishbourne, Charleston		
Marine and River Phosphate Mining and Manufacturing Co., Charleston		
Oak Point Mines, Charleston		400,000
Pacific Guano Co., Charleston		1,000,000
C. C. Pinckney, Charleston		
Rose Mining and Manuf'g Co., Charleston		100,000
South Carolina Phosphate and Phosphatic River Mining Co., Charleston		
Stono Phosphate Co., Charleston		500,000
Wando Phosphate Co.		100,000
Wilcox & Gibbs Guano Co.		305,800
Port Royal Fertilizer Co., (near Port Royal)		125,000
Gregg's Phosphate Mines, Charleston		
St. Andrew's Phosphate Mining Co., on Stono River		
Bradley's Phosphate Mines, near Charleston		
Pon-Pon Phosphate Mines, on Edisto River		
Dotterer's Phosphate Mines, near Charleston		
Farmers' Phosphate Co., Charleston		
David Roberts, on Wimbee Creek		
J. W. Seabrook, on Morgan River		
J. M. Crofut, on Beaufort River		
J. D. B. & J. Seabrook, on Parrot Creek		
J. G. Taylor, on Parrot Creek		

One of these companies has a surplus of exactly three times its total capital, and another has a surplus of more than double its paid-up capital.

The successful mining of phosphate rock under water requires a very liberal outlay of money and the best machinery that can be devised, while for grinding and pulverizing the rock after being mined, costly machinery of the most improved character is essential. Constant experiments are being made to devise new and better machinery for this purpose, and many inventions that promised well at the start have proved a failure when tested in regular steady work."

Ottawa Colonization Railway.

The construction of this line of railway would be a boon to the section of country through which it would pass. It is not only much needed by the settlers throughout the valley of the du Lièvre, but would be an appreciable acquisition in the development of the phosphate mining and lumbering interests of the district. It would stimulate mining in the localities where mines are now being extensively worked, and would foster an augmentation of the industry by opening up new fields where mineral is plentiful, but, owing to their inaccessibility, are valueless and neglected. It would be the means also of inducing immigrant farmers to take up and cultivate the many stretches of fertile land lying between the mountain ranges and on their slopes, which for agricultural purposes is unsurpassed in any part of this Dominion, and it would encourage present settlers to enlarge their farms and to engage extensively in agricultural pursuits, for it would enable them to reach a market for their produce, an advantage of which they are now deprived. In addition

to these benefits to be afforded by the construction of the Ottawa Colonization Railway, we have the very best authority for saying that the road, when completed, will afford a safe and remunerative investment for capital. The line, as located, starting from the village of Buckingham, takes a northerly and westerly direction, running in proximity to the important phosphate mines on the east side of the du Lièvre, and crossing the river at a favorable point penetrates the very heart of a rich phosphate-bearing region. For many miles it traverses a cleared and well cultivated section of country, and throughout its entire length no obstacle in the location of a favorable route was encountered and not one engineering difficulty was presented. As the plans and profiles show, the construction of the road from end to end would be inexpensive and much below the average cost of railway construction in this country. The Quebec Government has granted 4,000 acres of land per mile, the present value of which should be sufficient to at least grade the line and put on ties and rails, and with the construction of the railway the value of this land would be very much enhanced. There exists no reasonable doubt that as soon as any responsible company or individual can satisfy the Minister of Railways and Canals of their *bona fides* and ability to carry the construction of the road to completion, so soon will the Dominion Government also subsidize the Ottawa Colonization Railway as it has done in the case of innumerable other provincial railway enterprises, notably, her sister road, the Gatineau Valley Railway. This is a matter of much interest to the inhabitants of that portion of Ottawa county through which the road will pass, and they would like to know how soon they may expect to see a movement towards its construction. Whoever undertakes the work can rely upon receiving whatever co-operation and assistance is necessary from them to insure its successful accomplishment. The charter holders might give us some information on this subject.

VILLENEUVE MICA MINE.

This valuable property has developed into a steady producer of the highest grade of *muscovite*, and the crystals that are now being taken out are found to yield plates of the average sizes required by dealers and stove manufacturers. As has been before stated in these columns, in reference to this mine, plates of unusually large dimensions have been taken out, some measuring as high as 12 x 14 inches, and many very large crystals are being constantly met with, but the average yield of those taken from the vein is improving with each week's work in point of size, and the presence of discoloration has noticeably decreased. The mine has been visited during the past month by many practical and scientific men, all of whom have been highly pleased with its appearance and promise. Mr. L. H. Shirley, C. & M. E., of Montreal, in company with English capitalists, inspected the property last month and was much impressed with the permanent character of the vein, and the large number of mica crystals that are visible in all directions on the surface, and in the workings on the vein. The micaceous lead extends for many hundred feet, and has a width of from 50 to 60 feet. The tunnel which has been driven into the mountain has proved its continuity downwards, and from this tunnel, which is the only working yet started on the property, all the mica has been taken, of which several tons have accumulated

ahead of the cutters. The composition of the vein, in which the mica crystals occur, is chiefly feldspar and quartz, in which, besides mica, crystals of tourmaline are numerous. The formation at Villeneuve is similar to that in which the best mica mines of North Carolina have been opened, and the quality of the mica may be said to be identical.

Of the North Carolina mines, Mr. Arthur Winslow, M.E., in a letter to the *Engineering and Mining Journal*, of recent date, says:—"While recently on a trip to Mitchell County, a few of the mines in that important mica section were visited. The mica occurs there as a constituent of veins that traverse a highly feldspathic granite. The veins themselves may be regarded as granite dikes, of extremely coarse composition, made up of ill-defined mammoth crystals of mica, feldspar, and quartz. The distribution of the mica in the veins is irregular, but at those localities visited the larger crystals seemed to be in the central portion of the vein. A distinction of importance to the miner is made between what are called 'fluken veins' and 'rock veins.' The former are veins that have suffered from the disintegrating effects of weathering, and the rock is comparable to the 'brown ores' of the gold miner. The feldspar has been so decomposed in these veins that they can be easily worked with a pick, and the mica, which has remained almost intact, is extracted without much expense. It is to these veins that the work of the mound-builders, with their crude appliances, was confined. Such veins are limited in extent downward, and pass by degrees into rock veins, which latter are very hard and difficult to work. The mica is generally taken out in blocks an inch or two thick and a foot or so in diameter. The color of the sheets, when split, is white, a pale green, or a rum color. They are frequently spotted and blurred with stains of manganese or iron, and this very much lowers the market value. The white mica is always valuable, and the rum-colored is much sought after."

"The mines are often worked by the owners of the land or by companies. Leases on mica properties are generally given for one-sixth of the product with fluken veins, and for one-seventh with rock veins. The preparation of the mica for market is a very simple process, consisting in splitting it into sheets of about one-sixteenth of an inch in thickness, and in cutting these, according to patterns, into squares with a pair of ordinary tinner's shears. One man can split and cut many pounds in a day. The squares range in size from 3 by 4 inches upward. And the prices vary, according to size and color, from \$1 to \$5 and more a pound. The mining of this product is in many cases very crude, and is carried on on a small scale. Yet, with a good, average vein, the profits are large. The difficulty, of course, lies in securing a good vein. As with all veins, the material varies in composition, and the rich finds are generally in pockets that often contain, within a few cubic yards of vein rock, several hundred dollars' worth of mica."

It will be seen, from what Mr. Winslow says of the North Carolina Mica Mines, that, with the exception of the "fluken veins," the mica of Villeneuve is found in precisely the same rock composition, the vein at the Villeneuve mine, however, being much larger and more productive than those of Mitchell County, N.C., and other localities in the State. Here the quantity of merchantable mica appears to be unlimited, and under proper management the Villeneuve mine is capable of producing it at a larger margin of profit.

Gold Mining in Beauce.

The result of the past summer's work in the alluvial gold deposits of Beauce has been very encouraging to those who have been actively engaged in working them.

In many parts of the district gold has been found in paying quantity in the gravel beds, and prospecting has been successfully carried on among the quartz ledges which will no doubt lead to extensive quartz mining in the near future. But the most encouraging work that has been reported to us has been done by the St. Onge Gold Mining Company, on Slate Creek. After patient and determined prospecting, this company has at last hit upon the old bed of the river in their No. 8. shaft, at a depth of 180 feet, and are now being richly rewarded for their perseverance and large outlay. For several feet above bed-rock the ground carried more or less gold, and what is now being raised is washing quite \$10 per man, although the disintegrated surface of the bed-rock, where the coarse gold is deposited, and the gravel for six inches above it, has not yet been touched, and the bottom of the shaft is fully one hundred feet from the true bed of the river. This is certainly a marvellously rich showing, and there now exists no shadow of doubt that the coarse gravel and the bed-rock in the middle of the channel will contain large gold in quantity to pay enormously. These recent developments have greatly increased the value of ground along the lead, and it is anticipated that gold mining on Slate Creek will be extensively engaged in within the next few months. Such results as have attended the operations of the St. Onge Company were never met with in any other part of the Beauce district—not even on the Gilbert river in its palmiest days, when the gold excitement ran so high there. We will await with much interest the reports of the yield of the gravel on bed-rock, and will keep our readers informed from time to time of the results of future operations in this field.

A report has just reached us by telegraph that the gravel on bed-rock at bottom of shaft No. 8, on the St. Onge Gold Mining Company's property, is now being raised, and is found to carry coarse gold and nuggets in quantity, and that the week's *wash-up* has exceeded the most sanguine expectations.

THE ASBESTOS MINES.

The past summer has been one of more than usual activity at the asbestos mines of the Eastern Townships and an increased output over that of any former season has been the result. The most productive mines of the district are those in the Townships of Tretford, Cole-raine and Broughton. Several of these mines are being vigorously worked and all are yielding a very high grade of mineral. It is estimated that the output for the district for this season will aggregate about 1,400 tons, and the prices obtained for the different grades have been:—first quality, \$80; second quality, \$60; third quality, \$40; and the lowest grade, suitable only for pulp, \$10 per ton, at the mines. The force employed by the various operating companies aggregates 350 men, distributed as follows: King Brothers, 40; Boston Asbestos Packing Company, 100; the Johnson Company, 100; Ward Brothers, 20; Lionais & Company, 40; and Kennedy & Company, 50 men. A small additional force of men are engaged in desultory mining in the district, but neither their number nor the amount of asbestos mined by them has been taken into account in the foregoing statements. There is every conveni-

ence afforded for shipping the product of the mines, and those engaged in this industry are well pleased with the result of their summer's work. It is the opinion, however, of many practical men who have recently visited the mines that economical management is totally disregarded, and that under a better system much larger profits might be realized.

GRANITE WORKS.

The Canadian Granite Company have purchased a valuable property on the Canal Basin at Ottawa, where they are erecting extensive buildings to be used as a polishing mill. The granite, which is of excellent quality and of a pleasing salmon-red shade, will be brought from the company's quarry at Kingston to Ottawa in barges and dressed and polished at their new mill. The company will soon be ready to supply an unlimited demand of ornamental polished granite and monuments in every variety. The quarry is capable of furnishing an unlimited quantity of magnificent stone, and the machinery in the mill will be the most modern and complete in Canada.

THE NORTH SHORE MINES.

Lake Superior District.

There are few, if any, sections on this continent where such rich and massive deposits of silver ores have been discovered as those of the Lake Superior silver district. Native silver, like copper on the south shore of the lake, has been taken from many veins, and the average vein of the district is found to carry silver in sufficiently large quantity to insure profitable mining. Some of the veins that have been opened have produced such extraordinary rich specimens that prospectors have become excited and in their eager search for "bonanzas" will no doubt pass by extensive deposits of low grade ore which could be mined at a large profit. There is no certainty that the veins which have shown such very rich outcrops will continue to carry ore of so high a grade, and it is not to be expected that they will, but if they are found to yield ore in large quantity, that it will pay to work, then it will be seen that the profits of this mining industry can be regulated with much greater certainty by increasing the capacity of the machinery, and making it adequate to the productiveness of the mines, than by relying upon the continuance of high grade ores.

SILVER MOUNTAIN MINE.

This mine is attracting more attention at the present time than any other mining location in the new silver district. Prospect shafts have been sunk, from which very rich ore has been raised, and the vein is being thoroughly prospected by practical men of large means. The mine is a comparatively recent discovery, the location having been taken up by Messrs. Daunais, Richards and Trethewey a little more than a year ago. These gentlemen did some development work, sufficient to partially test their property, and then succeeded in inducing Cleveland capitalists to become interested with them. This syndicate have now an option on the mine, under which they are vigorously engaged in making further tests with a view to proving the continuity of the vein. A tunnel is being driven towards the vein, and if the result of this and other development work is satisfactory, preparations will at once be made for permanent and extensive

mining. Everybody is hopeful that the expectations of the owners and the syndicate will be realized, and those who are interested in the future of this mineral district are closely watching the result of each week's work at the Silver Mountain mine.

TWIN CITY MINE.

This mine was discovered in 1883, and the first development work was undertaken by gentlemen from St. Paul and Minneapolis, in which they expended upwards of ten thousand dollars. Their work produced a considerable quantity of native and black silver and a high grade of argentiferous zinc blende. This work, as far as it was prosecuted, proved most satisfactory to all concerned; but it was found, that operations could not be profitably continued without a mill and reduction works, and as the condition of the roads rendered the transportation of machinery practically impossible, operations were suspended. It is to be hoped that this obstacle will soon be removed. Meanwhile a promising property is neglected.

BEAVER MINE.

This is likely to develop into a very productive mine. It has been continuously worked during the past year, and what has been accomplished in the way of development warrants preparation for permanent work. The vein has been pronounced a true fissure and can be seen cutting the formation across two bluffs, one of them two hundred feet high, on either side of which it can be worked without the expense of hoisting or pumping. The vein carries some very rich ore and some of lower grade, and in the hands of a powerful company would no doubt pay largely if extensively worked.

SILVER CREEK MINE.

Like the *Twin City* and *Beaver* mines, this one was discovered in 1883. Work was not begun here, however, until a few months ago. It is in the same geological formation as the other important mines in the silver region, and the vein, which is about three feet wide, carries native silver and argentite. It is supposed to be a continuation of the *Twin City* vein, or one running parallel to it, and is steadily producing good stamp ore, which awaits being treated, and this will be done when roads have been opened that will enable the owners of the mine to take in machinery for that purpose.

On other three properties, known as *R. 48, 140 T.* and *57 T.* mines, work was also begun during the past summer, but has been suspended and will not be resumed until something definite has been done towards locating the new government road which has been so much talked about, and of which the district is seriously in need. These three properties are in the immediate vicinity of the *Rabbit Mountain*, the *Silver Creek* and *Beaver* mines, and give promise of developing into mines of not a little importance.

A party of Michiganders have organized under the title of the Peerless Mining Company for the purpose of operating in this new and attractive field and have taken up four locations within two miles of *Silver Mountain* mine. It is expected that this company will now organize under the laws of Canada and proceed to open up some of the ground they have recently acquired.

Many other American capitalists have come into the silver district during the past few months, to look for claims in which to invest, and the citizens of Port Arthur are beginning to open their eyes to the fact that it is quite possible all the choice locations may be taken up by their enterprising neighbors before they

have quite realized the richness of the mineral deposits by which they are immediately surrounded.

In the gold district work is being most successfully pushed at the famous

HURONIAN MINE

under the able superintendence of Mr. Charles Eschweiler, M.E., whose staff has been reinforced by the arrival of Mr. F. C. Smith, a prominent assayer of Milwaukee, and Mr. Richard Crow, of Boulder, Colorado, who has taken charge of the company's mill. With a competent staff of miners and workmen Mr. Eschweiler and his new assistants are carrying on operations at this mine with most satisfactory results. The vein is an unusually large true fissure, and the ore that is now being taken from the shaft, drifts and cross-cuts is so rich in gold that five stamps are paying all the running expenses of the mine. As the number of miners now employed could keep twenty stamps busy this is indeed a very satisfactory showing. The vein has been prospected to a depth of nearly 200 feet and drifted on for upwards of 400 feet at the 50 and 150 feet levels and has been found to carry high grade ore at all points in these workings. All the experts and miners who have visited the *Huronian* mine have predicted great results, under good management, and present appearances lead us to think that their predictions are about to be realized. The miners have been working in rich ore in both levels, and it may be said that wherever the vein is opened it is with the same encouraging result. Other discoveries have been made on the property, the most recent of which promises to be one of importance.

Iron Trade Depression.

The boom which has been predicted by some enthusiasts and anxiously awaited by everybody interested in this important trade has not yet begun to show itself. The *Hardware Trade Journal*, of Manchester, England, thus speaks of the continued depression:—

"There seems to be no silver lining yet visible to the cloud that hangs over the condition and prospects of the iron trade. In every direction the complaints are pitched in the same key—that of overproduction, and a consequent recession in prices. The home trade has not been so quiet for several years, through the limited ship building and railway making; and the export trade each month shows a smaller tonnage and value of the iron sent abroad. This depression has existed, with one or two brief intervals of sunshine, for seven or eight years—the result, it is to be feared, of the overproduction and the high prices of the ever-to-be-remembered years of 1872, 1873 and 1874."

The *Bulletin of the American Iron and Steel Association*, after reviewing the improved condition of business at the beginning of September says:—"The feeling of confidence that did not exist two months ago, and which is now everywhere visible, can be directly traced to the increased business which these two months have brought. In our iron and steel industries, however, candor compels us to say that the revival has not equally affected all branches. There is an increased demand for best grades of foundry and forge pig iron and a decided hardening in prices, but common grades remain as they were."

The *Iron Trade Review*, of Cleveland, O., writes editorially on September 5th, in a somewhat incredulous way, as follows:—

"The improvement in the iron market con-

tinues, but it won't do to crow much yet. If better times are coming, the best thing is to let them come and not make any fuss about it. One of the wisest things that can be done at the present juncture is to put a cold compress on the head of the exuberant Associated Press reporter at Pittsburgh."

THE HALIFAX MEETING

OF THE

American Institute of Mining Engineers.

FIRST SESSION HELD ON SEPTEMBER 16.

Address by Sir A. G. Archibald.

REVIEW OF NOVA SCOTIA'S GOLD FIELDS.

The Apatite Deposits of Canada, etc., etc.

The meeting of the Institute, which opened in Halifax, N.S., on the 15th September, was not so largely attended as had been anticipated, not more than 120 members being present. The arrangements for the meeting and for the entertainment and comfort of the members were perfect, and the hospitality and cordiality with which the Institute was received and entertained has made the meeting memorable.

The first session was held in the Legislative Council Chamber on Wednesday, the 16th of September, at which there was a large attendance of ladies and citizens. Mr. Jamme, chairman of the local executive committee, after welcoming the visiting engineers, introduced Sir Adams G. Archibald, K.C.M.G., who opened the meeting with an eloquent address, cordially welcoming the members of the Institute, from which we quote the following paragraphs, want of space preventing us from publishing the address *in extenso*. After expressing his gratification that the Institute should have honored Halifax by appointing a meeting of their body there, Sir Adams continued:—

"We welcome you on various grounds. If you had come on the visit merely as citizens of a friendly country, we should have been delighted to see you. You are connected with us by so many ties, the ties of a common lineage and a common language, a common literature and common traditions. You are sharers with us and the parent country in common political and judicial institutions, and in a fullness of freedom such as exists nowhere else in the world. Had you come, therefore, with these claims only on us, we should have been delighted with the opportunity of showing the gratification your visit would confer. You come, indeed, with all these claims on our regard, but you have others still. We welcome you on these grounds; but we welcome you also—some of you as representative of great industries in your own country—others as men of special skill and science, who have made your names household words everywhere. All of you are welcome as connected with a profession which has done more, perhaps, than any other to promote improvements in the material condition of the world."

"It has been the task of that profession to

groped in the bowels of the earth for the treasures that nature has hidden there, to clear them from the dross with which they are associated, to prepare and purify them for the use and comfort of man. You have had to organize inert matter, to put it into shapes and forms by which it could be utilized—so as first to create and then to direct a motive power—and thus making matter the slave of mind, to perform prodigies of power and endurance and speed which have revolutionized the world. We welcome you, therefore, as gentlemen connected with this great profession."

"But besides all this, we may have an *arrière pensée* not quite unselfish. We know that your visit will give us pleasure. May we be pardoned for entertaining the idea that it may also profit us in the result?"

"We claim in this province to be possessed of large mineral treasures. I do not refer to the gold and the silver, the royal minerals, because whether we have them or not is a matter of comparatively small importance to our country. But as regards those minerals which everywhere form the basis of national prosperity, those which are of absolute necessity and universal use—iron and coal; these we have unquestionably in great abundance and of excellent quality."

Sir Adams then gave a sketch of the familiar history of the grant of all the minerals of Nova Scotia and Cape Breton to the Duke of York, or, more properly, to his creditors, in 1826.

"For thirty years (half the term of the original grant or lease), the Mining Association held the minerals of the province back from development, and it was only in 1857, after years of wordy war, that the Association gave up its claim to all the minerals except the coal in certain small areas. The Legislature then vested in the owners of the lands all the minerals except gold and silver, lead, copper, coal, iron, tin, and precious stones. Under this agreement, mines have been opened in every part of the province. There are collieries actually worked in six of the eighteen counties into which the province is divided. Gold mines have been opened in twelve proclaimed districts in six counties, and in other districts, not proclaimed, in other counties. Already over one hundred coal leases have passed the Great Seal, and the leases of gold mines are innumerable."

"The royalties reserved are 10 cents a ton on coal; iron, 3 cents a ton on the ore; gold 2 per cent. and all other minerals 5 per cent. These royalties go to form a fund for the support of the local government, which derives in one way or another over \$100,000 a year from this source."

"While the freeing of our mines from the monopoly of the association gave an immense impulse to them, the fiscal policy which had governed our relations with the United States has tended to retard the development of our coal interests. From 1854 to 1866, our coal was admitted into the United States free of duty. When the reciprocity treaty was repealed, two-thirds of our entire sales were made to that country. After that, the States imposed a duty of \$1.25 a ton. This soon reduced our exportations to that country. The trade in six years dwindled from two-thirds to one-fifteenth of our whole sales. Then the duty was reduced to seventy five cents. But the trade continued to dwindle till in 1884, instead of being two-thirds, it fell to one twentieth of our entire sales. But in the meantime our total sales, notwithstanding the reduction in, or rather the extinction of, the sales to the United States, have gone on increasing from year to year, and last year we

sold well on to 500,000 tons more than we did when our trade with the States was in the most flourishing condition. It would seem, therefore, that our coal trade is not dependent on the United States market. But when the time comes, as doubtless it will, when the laws of nature prevail, when they are not overridden by fiscal restrictions, and the trade is allowed to flow in its proper channels, it will be found that the opening of American markets to provincial productions will not only greatly extend our industries, but will add to the comfort and convenience of the large classes in the neighboring country to whom cheap fuel, cheap light, and cheap mechanical power are unquestionable blessings."

Mayor Mackintosh followed with an appropriate speech, in which he cordially welcomed the visitors to Halifax and briefly referred to the more important mineral features of Nova Scotia.

President Bayles, on behalf of the institute, gracefully responded, and referred to the interest the American engineers and capitalists have in Nova Scotia's great mineral resources, more especially in its magnificent coal and iron deposits, from which, he intimated, closer commercial relations may enable them to draw supplies of fuel and ore for their eastern works.

In his opening address President Bayles discussed, in a very able manner, the relations of the engineer to labor, calling attention to the danger of the socialistic tendency of the times, and the necessity for guiding the movement into safe channels. The following extracts from his address contain the pith of Mr. Bayles' expressed views on this important subject:

"However blind we may be to the spread and influence of socialistic teachings, there is little excuse for persistence in cherishing the idea that the wage-earner has no cause for dissatisfaction with the present unequal and inequitable distribution of the products of industry. More general education, a free press, and organization for resistance or aggression, have been the agencies by which the working classes have gained clearer ideas of their power and opportunities. The dull despair of mediæval servitude has given place to an intelligent and profound discontent with a situation which every year seems to make them more hopeless; and I do not hesitate to venture the opinion that, unless strong and willing hands are extended to lift them up they will again and again reach from the mire to pull down and destroy that to which they cannot attain unaided."

"The wage-earner's future, in all but exceptional instances, promises nothing better than continuance in the labor he has learned, as a competitor with machinery which may at any time displace him and force him to seek some other and perhaps less congenial employment, or starve."

"The hopelessness of the position of the average wage-earner consists in his ignorance. The progress of the arts has been so rapid that few men starting in life without education are able to keep pace with them, or, indeed, to acquire such familiarity with principles that they can hope to attain to responsible positions of management. While the sphere of those born to serve has been thus steadily narrowing, the sphere of those so fortunately situated that they have been able to acquire liberal education is steadily broadening. The capitalist is rarely safe in intrusting his interests in mining or manufacturing to the merely practical man. Success in business enterprises of every kind now depends upon so many things of which the merely practical man knows little or nothing, that management is usually intrusted to the

man who combines education and experience, and his staff of responsible assistants is made up of young men of education who take subordinate positions to gain experience."

"But for industry and thrift there should be something better than our present industrial system gives. Arbitration should decide fairly and impartially the issues between workman and employer, and some part of the profits of production should seek investment in ways which will react favorably upon the interests of labor. Participation should be established on an equitable basis as the reward of faithful service, and co-operation should be promoted wherever and whenever it can benefit the wage-earners."

Upon the conclusion of the addresses, the remainder of Wednesday's session and that of Thursday were devoted to the reading and discussion of papers. Owing to the time set apart for this purpose being limited, only a few of the large number of papers presented were read. The following is a list of those that were heard and discussed:

The Nova Scotia Gold Mines, by E. Gilpin, Inspector of Mines, Nova Scotia. Studies in the Apatite Region of Canada, by Dr. T. Sterry Hunt, Montreal, Canada. The Pictou Coal Field, by J. S. Poole, Stellarton, Nova Scotia. Our Glacial Problem, by Rev. D. Honeyman, Halifax, Nova Scotia. Steel Castings, by A. V. Abbott, New York City. Topographical Models and their Uses, by E. A. Lehman, Philadelphia, Pa. An Electrical Furnace for Reducing Refractory Ores, by Dr. T. Sterry Hunt, Montreal, Canada. A New Method for the Determination of Phosphorus in Iron and Steel, by J. B. Mackintosh, New York City. The Specific Gravity of Low-Carbon Steels, by G. S. Miller, Benwood, West Va. The Manufacture of Iron in Canada, by J. H. Bartlett, Montreal, Canada. The Coal Fields of Cumberland County, Nova Scotia, by R. G. Leckie, Springhill, Nova Scotia. The Homogeneity of Open-Hearth Steel, by H. H. Campbell, Steelton, Pa. Improvements in Ore-Crushing Machinery, by S. R. Krom, New York City. Note on a Self-Dumping Water-Tank, by W. Ide Pierce, Tangier, Nova Scotia. The Estimation of Manganese, Carbon and Phosphorus in Iron and Steel, by Prof. Bryan W. Cheever, Ann Arbor, Mich. E. D. Campbell's Colorimetric Process for Estimating Phosphorus in Iron and Steel, by Prof. Bryan W. Cheever, Ann Arbor, Mich. The Oil Regions of Pennsylvania and New York, by A. C. Ashburner, Philadelphia, Pa. The Contraction of Iron under Sudden Cooling, by H. M. Howe, Boston, Mass. The Philosophy of Fire-Brick Hot-Blast Stoves, by Frederick W. Gordon, Philadelphia, Pa. The Wolf Benzine-Burning Safety-Lamp, by E. J. Schmetz, Columbia, S. C. The Cape Breton Coal Field, by W. Routledge, Sydney, Cape Breton. The Amalgamation of Gold Ores and the Loss of Gold in Chloridizing-Roasting, by C. A. Stetefeldt, New York City. Lixivation and Amalgamation Tests, by F. W. Clarke, Boston, Mass. The Geology of Natural Gas, by C. A. Ashburner, Philadelphia. Notes on the Treatment of Gold Ores, by William Bruckner, Marysville, Mont. Basic Bessemer Materials, by Prof. T. Egleston, New York City. The Blast-Furnaces of the North Chicago Rolling-Mill Company, by Frederick W. Gordon, Philadelphia, Pa.

The Apatite Region of Canada.

Dr. T. Sterry Hunt, in presenting a verbal abstract of his paper, entitled "Studies of the Apatite Deposits of Canada," alluded to his published communication on the Canadian Apatite Deposits made to the Institute in February, 1884,

and proceeded to describe some of the later results of mining apatite in the Lièvre district, to the north of the Ottawa river, where the mines are as yet confined to a small area in the townships of Buckingham, Portland, Templeton and Derry; earlier workings having been along the Rideau Canal to the south of the Ottawa. The large mining operations recently undertaken in the Lièvre district show that the crystalline phosphate of lime or apatite belongs to lodes of great size, which traverse the ancient gneiss of the region. These lodes include granitoid feldspathic and pyroxene rocks with large masses of quartz, of carbonate of lime, of pyrites and of apatite. All of these often show a banded structure not unlike that of the gneiss, to which they are evidently posterior, and of which they often contain fragments. Their study is full of interest to the geologist. The mining operations on these great lodes, which are often over one hundred feet in breadth, are in part by open cuts and in part by shafts, and have reached depths of a little over 200 feet. The production of some three or four of these mines in 1884 was from 4,000 to 5,000 tons each of commercial apatite. The improved machinery, and the better system now being introduced here, is greatly increasing the yield of these mines, some of which during the past summer have put out 600, 700, and even 1,000 tons in a month. The mineral, yielding on an average eighty per cent. of phosphate of lime, is now worth in Montreal eighteen dollars per ton, and is mined with great profit. It is chiefly shipped to Great Britain, where it is used for the manufacture of high grade superphosphates; but it is believed that in the near future a larger market will be found for the apatite in the United States and Canada. The growing demand for high fertilizers on this continent, and the fact that the apatite of Canada may be shipped to the valleys of the Ohio and Mississippi at much cheaper rates than the phosphate rock of South Carolina, gives a great importance to these Canadian mines. The output from those of the Lièvre district this year will probably exceed 30,000 tons. Works on a large scale are now in construction at the lower falls of the Lièvre on the line of the C. P. R., for the grinding of phosphates and the manufacture of fertilizers. While the productiveness of the Lièvre mines has caused the neglect of the earlier discovered deposits of the Rideau district, there are among these some which, in the speaker's opinion, will be found, when properly developed, not inferior to those of the Lièvre, and he believes that these two districts of phosphate-bearing veins in Canada will soon become an important source of revenue to the country, and a great benefit to the agriculture of the continent.

Nova Scotia's Gold Mines.

BY

EDWIN GILPIN, JR., A.M., F.G.S., F.R.S.C.

The reading of this paper was listened to with much attention. Mr. Gilpin dwelt at some length upon the composition of the auriferous veins and the geological features of the formation in which they occur, and gave some interesting information on the mining and milling systems in vogue in the province, and the cost of production of the precious metal. Want of space prevents us from publishing now the full text of Mr. Gilpin's paper, but it is our intention to do so in our next number.

In the afternoon of Wednesday the visitors enjoyed a delightful cruise in the Halifax harbour under the auspices of the executive committee, and in the evening they attended a promenade concert and fireworks in the public

gardens given in their honour. On Thursday evening the members of the Institute attended a reception in the Province building, tendered them by the citizens of Halifax, and on Friday morning the visitors took their departure, having been divided into three parties, one of which, the largest, going to Pictou and Cape Breton to inspect the coal mining industries of those districts. Another party made a tour of Grand Pre and the Annapolis Valley, stopping at Windsor to view the extensive gypsum quarries, while the third party visited the Spring Hill and Joggins' coal mines and the famous Londonderry iron mines.

THE MONTAGUE GOLD MINES

were visited by one of the parties and at the *New Albion* mine the engineers saw one of the most remarkable collections of gold ore ever seen in America. The samples of quartz were so filled with strings of gold that the pieces of rock were held together by the precious metal.

Professor G. H. Torrey, United States Assayer at New York, was with the visitors, and has an intimate knowledge of the Nova Scotia gold mines, of which he holds a high opinion. He says that gold mining in the province may be considered as hardly yet in its infancy, and thinks that mining success in Nova Scotia in the future will be found largely, if not altogether, in her low grade ores, from slate belts, and in deep mining. In conversation, Prof. Torrey pointed to the history of the Black Hills, which shows that the mining of low grade ores will pay when found in large seams. And, he remarked, if it will pay there—two hundred and fifty miles from railway communication, where every pound of supplies has to be carried, with wood scarce and labour \$3 per day—how much more will it pay in Nova Scotia, where the gold fields are close to the railway or seaboard, where there is an abundance of ore, and labour at \$1.50 per day. In reply to a question as to why, in the face of these manifold advantages, American capital is not more liberally invested in our mines, Mr. Torrey, pertinently replied: "If your people show their faith in your own country by their works and investments, you will find our people willing to put in perhaps an equal amount of faith and cash."

THE DRUMMOND MINE

at Westville was visited, and the Acadia mines. Those who went to the *Drummond* were shown over the works, and several of the ladies went down the shaft. This colliery is running on full time, giving employment to 450 men and boys, and has a daily output of 600 tons. It is now owned by Montreal parties, who have a capital of \$750,000, and is famous on account of the great explosion of 1873, when the mine was destroyed by fire and sixty-five men and boys perished. The present workings have reached a depth of 2,800 feet.

Sir George Elliott, the wealthiest colliery owner in the north of England, was with the visitors to the *Drummond* and has laid before Montreal capitalists a scheme for pooling or amalgamating the four Pictou colliers under one powerful syndicate with increased capital and more economic management, with a view to putting an end to the existing competition. Sir George inspected the *Albion*, *Vale* and *Acadia* mines as well as the *Drummond*, and was particularly struck with the vast quantity of coal available. He declared that, considering the depth, there is three times more coal in Nova Scotia than in any similar area in the world, and that this vast deposit had not yet been even "scratched."

GYPSUM QUARRIES.

Those of the members of the Institute who formed the Annapolis party were entertained at Windsor and inspected Mr. Dimock's gypsum quarries on the banks of the river Avon. These are among the finest white gypsum quarries on this continent and were inspected with much interest by the visitors.

AT GRAND PRE

this party made a short halt and were given an opportunity of visiting the forge of Basil, the blacksmith, the cottage of Evangeline, the grave of Evangeline's father, and several other points of interest in the locality.

During the excursions of the different parties the more important coal, iron and gold mines in operation were inspected by the Mining Engineers, as well as the gypsum quarries. The visitors saw a great deal that was new and interesting to them and no doubt gathered much information. The Halifax meeting of the American Institute of Mining Engineers is pronounced to have been in every way successful, and it will probably have the effect of giving an impetus to the mining industries throughout the Province of Nova Scotia.

GOLD IN BRITISH COLUMBIA.

Rich Mines on the Columbia River—Placers that in 1862 Yielded 300 Ounces of Dust a Day—Crumbling Red Quartz with Yellow Veins and Flakes of Pure Gold.

It will be remembered that about twenty-five years ago enormously rich discoveries of gold in placers were made in the northern interior of British Columbia, or "the Fraser River country," as it was then more popularly known. It was no uncommon thing in 1862 to take from one claim on the southern or eastern slopes of the Caribou Mountains 250 or 300 ounces of gold a day, equalling a coin value in New York (at that period of high premiums) of from \$5,000 to \$8,000. The lavish and riotous waste which ensued during the season that this continued was never exceeded in the romantic annals of gold mining.

Further prospecting in that region led to the discovery, in 1866, of good placers upon Gold and McCullough Creeks, near the Big Bend of the Columbia, and some working was done there under almost insurmountable difficulties for one or two seasons. The great expense and hardship to be encountered by miners in that remote and inclement region caused its early abandonment, however, though it was well known that valuable mines would be opened there as soon as the advance of civilization rendered them accessible.

The approaching completion of the Canadian Pacific Railway has now brought about this result by opening communication into these mineral-bearing mountains, and the miners are again flocking to the deserted creek beds and rehabilitating the abandoned camps. Though the present summer has witnessed the beginning only of the new era of prospecting and mining, there is every promise that the movement will be continuous and increasing until a large and prosperous mining population shall enliven the solitudes that are now rarely penetrated by the most daring Indian.

The Rocky Mountains trend so rapidly westward, north of the boundary line, that in latitude 52°, about where the new railway crosses, they lie considerably west of the meridian of

Salt Lake, and, instead of being 600 miles wide, as in Colorado and Utah, they are not over 150. They consist in that region of three parallel masses or ranges. The easternmost is the Rockies proper, the water-shed between the Atlantic and the Pacific. It is here a broken and disordered range of uplifted metamorphic rocks covered with ice and snow, and formed, by their original rupture and the subsequent effects of the weather, into shapes of the most fantastic, yet gigantic, beauty. Next westward, is the equally grand and lofty, but more orderly, range, called the Selkirks, whose glacier-capped summits bristle with innumerable black pinnacles, making most striking scenery. Beyond the western foothills of these rises a third and lesser uplift, known as the Gold Range, in which, no doubt, may be traced the geological, if not the geographical, backbone of the continent and beyond which the land falls away to the plateaus of British Columbia.

These three ranges are separated from one another by the Columbia river.

This great water-course rises in some lakes lying near the international boundary between the Rockies and the Selkirks. Thence, a strong swift stream, it flows northward for 100 miles before it can find its way past the huge wall of the Selkirks on its left; then it makes a sudden sharp sweep westward around the northern end of this range, and begins a course straight southward, between the western flank of the Selkirk and the eastern foothills of the Gold Range, and continues this until it has descended to the mouth of the Snake River in Idaho, when it turns westward to the sea, dividing Oregon from Washington Territory. The sharp sweep which the river makes around the northern end of the Selkirks is called the Big Bend, and it is there that the new gold excitement finds its present focus, though Farwell is the entrance point and supplying centre.

The placer deposits worked by the miners of '66 in Gold and McCullough Creeks, which enter the river near the Big Bend (whose landings, Boat Encampment and La Porte, will be recalled), showed that in the Gold range, whence they came, there must be mother ledges of auriferous quartz; but when it was found impossible to supply themselves even with provisions, any thought of the introduction of machinery needed for the working of quartz was, of course, futile. Now, however, prospectors are finding quartz ledges and the construction of the railway, to be completed in November of the present year, will furnish a means for the introduction of needful machinery and supplies.

The course of the railway through Kicking Horse Pass in the Rockies, Beaver Pass in the Selkirks, and Eagle Pass in the Gold Range, leads it to make its second crossing of the Columbia at Farwell, only forty-five miles below the two placer-bordered creeks mentioned. Next year, doubtless, a steamboat will be put on between Farwell, the town now growing up at the crossing, and the Big Bend, but at present a trail for pack-horses, which is to be extended into a waggon road next spring, is the only means of ingress. This lack of a road for only forty-five miles may seem a trivial obstacle to some readers, but those who have ever seen the roughness of those foothills and the amazing density and the gloom of the forests will readily understand the vital importance of a road. The trail is being cut by the Provincial Government, which will also build the waggon road. It is impracticable to pull an ordinary boat up the river.

This work would not be done, of course, had not recent explorations confirmed the old information and added much that is new. Several

ledges which have long been known on McCullough and Gold Creeks are now being thoroughly examined by means of shafts and tunnels in order to determine their extent and probable value. On another stream, French Creek, close by, quartz rich in both gold and silver has been opened, and it is thought to be abundant. Every day brings word of some new "find" in the neighbourhood, and the expectations of every one who has seen the specimens brought back are roused to the highest pitch.

That it is reasonable to suppose that good mines will be developed in that region is indisputable when one studies the relation between this Big Bend district and the other gold and silver producing districts of the North-West. The line of uplift, continuous with the Gold and the Selkirk ranges, and extending to Grace River and beyond, is that upon which, in 1862, the fabulously rich Caribou placers were found, implying, of course, quartz in the heights behind. Along the Canon River, between the Caribou and the Big Bend districts, every little snow-fed stream yields more or less of the precious metal, and at Big Bend the deeper the mountains are penetrated the more encouraging are the reports. Following southward along these ranges, creek after creek pours into the Columbia its tribute of golden gravel, in many places destined to attract miners now overlooking anything less than the extraordinary. The valley of the Illecillewaet, by which the railway descends the western slope of the Selkirks, shows that it is worth while to prospect the whole of that range on account of its exhibition of lodes yielding rich assays in silver, galena, chlorides, and sulphurets. Further down in the Kootenay district are mines now well advanced that are yielding ores which pay a fine profit after being carried on horseback or in waggons for 200 miles, and then shipped to Omaha or San Francisco for smelting. The same line of mountains traced still further southward leads to the mining regions of Montana and Idaho, to the richest regions of Utah, and so on to Arizona and Mexico.

Moreover, the appearance of the ores produced in this far North-West is similar to that of the rock found to be rich in Kootenay, Montana and Utah. Silver specimens closely resemble the ores at Butte City, Montana, while the gold-bearing rock from Big Bend would be easily mistaken for that coming from the Summit district of Colorado, where some ore is worth \$20,000 a ton. This gold ore is a rusty, reddish, half decomposed quartz, through which the gold is distributed in thin streaks, where it lies crowded in flakes easily visible to the naked eye, and often in places as large as the head of a lead pencil. Some small pieces of quartz are more than half their weight in pure gold.

It is quite certain that next spring will see a great rush to the Big Bend, and that after the inevitable boom of noise, success, failure, and experiment passes by, a residuum of solid and increasing value will remain, out of which a very productive gold and silver district will be made to yield its much-needed addition of coin.

James W. Marshall, the discoverer of gold in California, died on the 10th of August at his home in Kelsey. He was seventy-four years old and died a poverty-stricken and disappointed man.

The lime cartridge, for use in coal mining, seems to be growing into general favor in England. The *London Mining Journal* reports that it is proving a decidedly economical substitute for dangerous shot firing.

CALUMET AND HEOLA.

This world renowned copper mine is now opened for fifteen years ahead. That is, if not another stroke of development work were made, or if the mine "petered" at the bottom, fifteen years of copper product at the present rate of annual production could be taken out of the mine. If the Tamarack shaft demonstrates the continuance of the Calumet vein throughout its property, President Agassiz says that the company has then sixty years of copper production in its territory. At the recent annual meeting President Agassiz told the stockholders that the mine was now producing 500 tons more of mineral per month than last year, at very little increased cost. Five hundred tons per month means 6,000 tons per year, which, assaying seventy-five per cent. pure copper, means 4,500 tons of ingot, which, at \$200 per ton, or ten cents per pound, is \$900,000 per annum.

THE TREADWELL MINE.

Sixty thousand dollars in bullion was forwarded in September from this wonderful quartz mine on Douglas Island, Alaska, and represents a considerable profit to those interested.

With the machinery used the cost of mining and milling the ore will not exceed at the utmost \$1.50 per ton, while Mr. Treadwell states that he can mine and mill it for \$1.10. The ore pays about \$8.50 to the ton, so it can readily be summed up the amount of profit that is made from the mine. Considering the inexhaustible quantities of paying ore there is in this phenomenal deposit, the owners have a constant source of wealth, and the development has been done by a very few California capitalists.

The mill at the mine is probably the largest and best constructed stamp-mill in the world. It has 120 stamps, runs day and night, and requires 250 miners and other employees to keep it working. The machinery is all of the latest and most approved pattern, and there is ore enough in sight to run the 120 stamps for fifty years.

Senator Jones, of Nevada, one of the parties interested, has recently visited the mine and pronounces it the *biggest thing on record*.

MINING NOTES.

NOVA SCOTIA.

A deposit of copper ore has been discovered near Pugwash, situated close to the main road and within a short distance of the coast.

The gold mine at East Rawdon continues to yield good returns. During the month of August gold to the value of \$8,350 was taken out.

A brick of gold weighing 54 ounces was taken to Halifax in September from the Caribou mine. The brick was valued at \$950 and was the result of three weeks' labor of six men.

A manganese property in East Onslow, Colchester County, has passed into the hands of a New York firm, who have the necessary means and practical knowledge to work it to advantage.

The largest bar of gold ever seen in Nova Scotia was taken to Halifax last month from the New Albion mine at Montague. It weighed 1,054½ ounces and was the product of fourteen days' crushing in a twenty-stamp mill. It was valued at \$20,619.

The Cowan mine at Kemptville, 23 miles from Yarmouth, is doing good work. From the last crushing gold to the value of \$1,600 was obtained, and there is every prospect that the next crushing will yield a still better return. Thirty men are employed at this mine and the force will be increased so soon as provision can be made for additional accommodation.

Returns from the Nova Scotia gold mines, received up to September 15th, show the following production:—

Districts.	Tons Quartz.	Oz. Gold.
Salmon River.....	960	725
Sherbrooke.....	112	16
Lake Catcha.....	214	217
East Rawdon.....	136	420½
Uniacke.....	76	12

PROVINCE OF QUEBEC.

The Albert Mining Company are about to introduce steam drills in their copper mine at Capelton.

Six asbestos mines in the Eastern Townships give employment to 350 men, and the yearly output aggregates 1,200 to 1,400 tons.

The Orford Copper and Sulphur Company are stacking their surplus ore near the Passumpsic Railway track so that it can be conveniently loaded into cars when wanted.

The only mica mine that is being worked in the province is the *Villeneuve* mine. With a small force employed this property is yielding abundantly and the mica is of the very highest grade.

The phosphate mines of Ottawa County are turning out more ore now than at any previous period since they were opened. Four mines give employment to 333 men, from which the September output aggregated 2,555 tons.

The St. Onge Gold Mining Company have penetrated wonderfully rich gravel at the bottom of their shaft on Slate Creek, and are now washing gold in quantity. This company have no doubt hit upon the richest alluvial gold deposit in the Beauce district.

PROVINCE OF ONTARIO.

A company at Lake Linden, Michigan, have secured important mining property in the Silver and Rabbit Mountain regions of Canada.

A deposit of copper ore near Sudbury is being prospected by New York parties under a bond from the owners. An equitable arrangement has been entered into by the parties concerned by which the owners receive a royalty on ore extracted while the property is being tested. The lessees have bound themselves to extract a certain number of tons of ore quarterly or pay the royalty on the specified amount. The lease is for one year with option to purchase, and renewable under certain conditions.

Mr. Charles F. Eschweiler, superintendent of the Huronian mine, Lake Superior district, recently forwarded a sample of ore taken from the vein to Ledoux & Ricketts, assayers, New York, and has received the firm's report of assay, as follows:—138.49 ounces of gold and 1,057.22 ounces of silver per ton of 2,000 lbs. Taking gold at its value of \$20.67 per ounce and silver at \$1.07 per ounce, the assay shows a value of \$2,852.58 in gold and \$1,131.33 in silver, or a total of \$3,983.91 per ton.

BRITISH COLUMBIA.

Gold has been struck on Finley Creek, Kootenay district, and a great many Chinese are moving in from the Wild Horse country to work the placers.

Men working on the government trail from Goat river to the Fort Shepherd trail have found gold quartz on the route. The news has drawn many prospectors thither.

Work in the galena mines at Upper Kootenay is at a standstill. The Ainsworth Company have only a few men employed, and the Connecticut Company are nearly idle.

It is rumoured that the iron mine at Sooke, owned by F. G. Richards & Co., of Victoria, has been sold to English capitalists and that it will soon be opened and smelting works established.

The mines at Kootenay are developing well, according to report of Gold Commissioner Vowell, and are giving every appearance of yielding an abundant supply of good ore. The "Ella" and "New Jerusalem" claims are giving rich indications.

A large party of eastern gentlemen, connected with the Kootenay Mining and Smelting Company, having a mining expert from Germany with them, came over the Northern Pacific line and passed up to the lake on Sept. 1st, their object being to locate a smelter and erect plant.

Great complaints are heard on all sides from miners and others in the Kootenay district on account of the uncertainty which prevails with reference to the Ainsworth land grant. It is said that unless something is done shortly in this matter it will very much retard the progress of mining in that section.

It is said that petroleum has been discovered in British Columbia. It was observed floating on a small creek about 100 miles from Victoria. It is opaque and nearly as thick as molasses; poured on paper it burns freely and emits the odor of coal oil. It is supposed that near this spot will be found a large supply of native petroleum.

A large number of miners from Lorne Creek arrived in Victoria in September. They report the mines have been worked out, and none of those who came down had any more than they went up with. There has been some gold taken out, but the money expended in getting it will nearly balance this. A few, however, have taken out somewhat more than expenses.

At the Shuswap Silver Mine a tunnel has been driven for 80 feet, and some cross-cuts have been made. The company are now sinking a shaft and report the ore improving as work progresses. There is an almost inexhaustible quantity of ore, and if it is found to carry silver in paying quantity it is expected that Montreal capitalists will immediately commence the development of the mine.

The Kootenay Mining and Smelting Company are very active and persevering in their efforts to get to work this year. They have completed their work in so far as getting communication with the Northern Pacific railroad, having now a direct route from thence to the mines. Parties going to the mines can now go

from Sand Point, on the Northern Pacific railroad, direct to any part of the lake in twenty-four hours by taking the new road from Mud slough to the river at Bonner's Ferry and the company's steamer to the mines.

The representatives of a company of eastern and Chinese capitalists have been in negotiation with the government of British Columbia for some time with the object of introducing the manufacture of iron and steel on a large scale. It is proposed to erect extensive smelting works near the iron deposits on the east coast, and proceed to open them and manufacture steel and iron for export to China and Japan. The company have unlimited means.

The gold strike on Granite Creek, a branch of the Semilkameen River, close to the American boundary, is attracting wide attention. Upwards of 1,000 men are in the district, whose success varies from food to \$100 a day per man. Access to the diggings is gained via Hope and Fraser river, and provisions are plentiful. Benches on the upper part of the creek are said to prospect well, nuggets worth from \$8 to \$10 are being taken out. The creek is staked off for two and a half miles from its mouth. There is also reported a rich quartz strike on Kettle River, but as yet little is known of it.

UNITED STATES.

The Calumet and Hecla product for the month of August was 2,575 tons, 1,285 pounds.

The output of the mineral products of the United States, in 1884, were valued at \$103,104,620.

The production of phosphates in South Carolina for 1884 was 409,000 tons of rock and 236,884 tons of fertilizers.

The total amount of assessments levied by the Eureka Silver Mining Company, of Nevada, is \$350,000. The total amount paid in dividends aggregates nearly \$5,000,000.

Of gold and silver the mint authorities estimate the production in the United States, in 1884, at \$30,800,000 gold, and \$48,800,000 silver (coining rate); total, \$79,600,000.

The Plymouth Consolidated Mining Company, California, have paid their twenty-eighth successive monthly dividend of fifty cents a share, aggregating \$50,000 and making \$450,000 paid to their shareholders this year.

Unified Diamond Mines (Limited).

This company has been organized in London, England, with a capital of £10,000,000, with the view to purchasing as large a number as possible of the diamond mining properties, situated in the four mines, Kimberley, De Beers, Dutoitspan, and Bultfontein. These four mines, since their discovery in 1870, have produced more than £40,000,000 worth of diamonds. According to the official statistics of the Cape Colony, the product of the four mines added together exceeded during the last two years the respective figures of £2,680,000, and £2,480,000, even at the actual low price of diamonds. At a meeting of directors held August 7th, the note upon the purchase scheme was amended. Indebted companies are to pay fifteen shares of £20 each for eight debentures of £2 each.

A Large Piece of Amber.

A piece of amber weighing eight pounds is at present being exhibited in the Mark Museum at Dantzig, for which the owner has refused £1,500. It is probably the largest piece in the world without blemish. Frederick the Great, more than a century ago, paid the same sum for a piece weighing 13 lbs., which is preserved in the mineralogical museum at Berlin; but it has gaps and cavities. Two beautiful pieces of work in amber are also to be seen in Berlin. One is a flute, which also was an acquisition of Frederick the Great. The other is a complete tobacco-pipe, belonging to Frederick William III., the father of the present Emperor; it bears an admirably carved likeness of that monarch.

NOTES.

The exports of iron ore from Spain during the first five months of 1885 were 1,226,377 tons.

Four thousand five hundred and sixty feet is the depth recently reached by a Prussian diamond drill.

The opinion is now entertained that the art of making artificial stone is pre-historic, and that the Pyramids were built of that material.

Spain exported during the first five months of 1885, 51,235 tons of pig lead compared with 52,119 tons during the same period in 1884.

From a report of the Commissioner of Lands of British North Borneo it appears that gold exists in considerable quantities in that territory.

The total value of all minerals raised in the United Kingdom in 1884 is reported as £61,232,028 at the mine, as against £64,635,834 in 1883.

The exportation of ingot copper from Spain during the first five months of 1885 amounts to 11,688 tons compared with 6,223 tons during the same period in 1884.

The deepest mines in Great Britain are in Cornwall and Devon, the three deepest being Dolcoath, 2,446 feet; Clifford Amalgamated, 2,232 feet; and Tresavean, 2,100.

El Callao: this famous Venezuelan gold mine produced 10,518 ounces of gold during July, worth about \$203,786. It paid a dividend of \$2.40 per share, aggregating \$77,280.

C. G. Hussey & Co., at Pittsburg, Pa., have just made six sheets of copper that are believed to be the largest ever rolled. Each sheet is 13 feet 9 inches long and 9 feet 7 inches wide.

The deepest boring in existence is for coal near the village of Schladebuch, between Corbetta and Leipzig, which has reached a depth of 4,559 feet. This boring is 1,872 inches at the bottom and 11 inches at surface.

The New South Wales Gold Product for 1884: according to the annual report of Mr. C. S. Wilkinson, F.G.S., F.L.S., Inspector, was 104,932.68 ounces (\$2,100,000), being 16,844.70 ounces (\$316,000) less than product of 1883. Thus it is apparent that the annual product of the Australian gold fields continues to decrease steadily year by year.

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Notice to Contractors.

SEALED TENDERS addressed to the undersigned, and endorsed "Tender for additions to interior fittings, &c.," will be received until FRIDAY, the 2ND OCTOBER next, for the execution of the additions and alterations and interior fittings, &c., required in the

POST OFFICE

—AT—
OTTAWA, ONT.

Plans and specifications can be seen at the Department of Public Works, Ottawa, on and after Wednesday, 23rd instant.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied and signed with the actual signatures.

Each tender must be accompanied by an accepted bank cheque, made payable to the order of the Honorable the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party decline to enter into a contract to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,
A. GOBEIL,
Secretary.

Department of Public Works, }
Ottawa, 22nd Sept., 1885.

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Lots 25, 26, 27 and 28, in the 3rd range. Some excellent surface shows have been uncovered on these lots and only require capital for developing. Price and particulars given at the office of the MINING REVIEW.



CONTRACT FOR SUPPLY OF MAIL BAGS.

SEALED TENDERS addressed to the Postmaster General, (for Printing and Supply Branch), and marked "Tender for Mail Bags," will be received at Ottawa until 12 o'clock, noon, on MONDAY, the 2nd NOVEMBER, 1885, for the supply of the Post Office Department of Canada with such Cotton Duck, Jute and Leather Mail Bags as may from time to time be required for the Postal Service of the Dominion.

Samples of the Bags to be furnished may be seen at the Post Offices at Halifax, N.S., St. John, N.B., Charlottetown, P.E.I., Quebec, Montreal, Ottawa, Toronto, London, Winnipeg, Man., Victoria, B.C., or at the Post Office Department at Ottawa.

The Bags supplied, both as regards material and manufacture, to be fully equal to the samples, and to be delivered from time to time in such quantities as may be required at Ottawa.

The contract, if satisfactorily executed, shall continue in force for the term of four years, provided always the workmanship and material be satisfactory to the Postmaster General.

Each tender to state the price asked per bag in the form and manner prescribed by the form of tender, and to be accompanied by the written guarantee of two responsible parties, undertaking that in the event of the tender being accepted, the contract shall be duly executed by the party tendering for the price demanded. Undertaking also to become bound with the contractor in the sum of two thousand dollars for the performance of the contract.

Printed forms of tender and guarantee may be obtained at the Post Offices above named, or at the Post Office Department, Ottawa.

The lowest or any tender will not necessarily be accepted.

WILLIAM WHITE,
Secretary.
Post Office Department, Canada,
Ottawa, 1st October, 1885.



GRAND COLONIAL

Exhibition in London, Eng., 1886.

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First Royal Exhibition Commission Since 1862.

THE Colonial and Indian Exhibition to be held in London, England, commencing May 1st, 1886, is intended to be on a scale of great magnitude, having for object to mark an epoch in the relations of all the parts of the British Empire with each other.

In order to give becoming significance to the event, a Royal Commission is issued for the holding of this Exhibition, for the first time since 1862; and His Royal Highness the Prince of Wales has been appointed President by Her Majesty.

The very large space of 54,000 square feet has been allotted to the Dominion of Canada by command of the President, His Royal Highness.

This Exhibition is to be purely Colonial and Indian, and no competition from the United Kingdom or from foreign nations will be permitted, the object being to exhibit to the world at large what the Colonies can do.

The grandest opportunity ever offered to Canada is thus afforded to show the distinguished place she occupies, by the progress she has made in Agriculture, in Horticulture, in the Industrial and Fine Arts, in the Manufacturing Industries, in the Newest Improvements in Manufacturing Machinery and Implements, in Public Works by Models and Designs; also in an adequate display of her vast resources in the Fisheries and in Forest and Mineral wealth, and also in Shipping.

All Canadians of all parties and classes are invited to come forward and vie with each other in endeavoring on this great occasion to put Canada in her true place as the premier colony of the British Empire, and to establish her proper position before the world.

Every farmer, every producer, and every manufacturer, has in erect in assisting, it having been already demonstrated that extension of trade always follows such efforts.

By order,
JOHN LOWE,
Sec. of the Dept. of Agriculture.
Ottawa, 1st Sept., 1885.

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CANADIAN MINING REVIEW

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1885—OTTAWA, NOVEMBER—1885

VOL. 3.—No. 8

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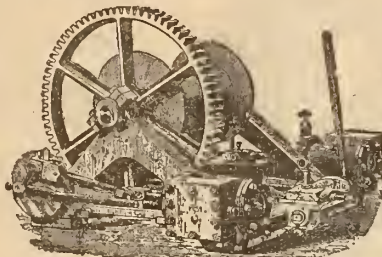
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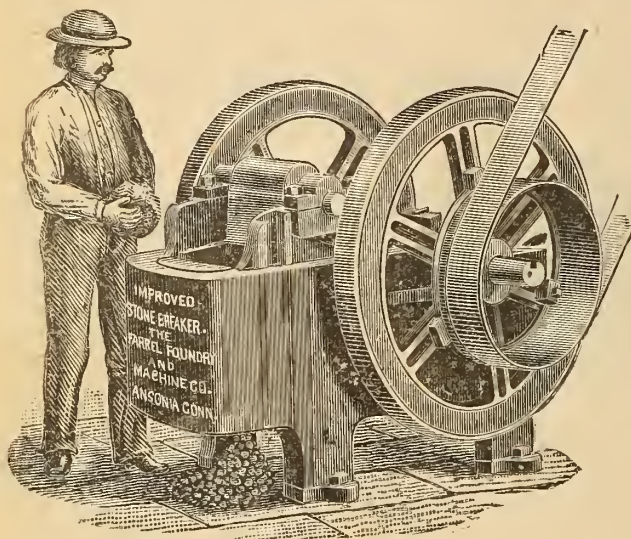
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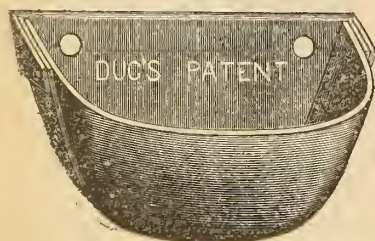
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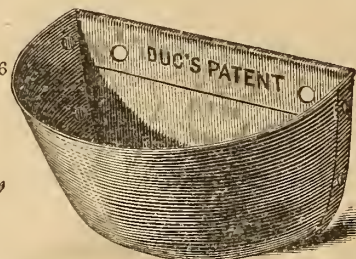
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Forms of Tender and Specifications can be had at this office, where all necessary information can be obtained.

Separate tenders will be required for each work, and must be endorsed "Tender for Removal of Snow, Public Buildings," and "Removal of Snow, Rideau Hall" respectively.

Each Tender must be accompanied by an accepted bank cheque, made payable to the order of the Honourable the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party declines to enter into a contract when called upon to do so, or if he fails to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

By order,
A. GOBEIL,
Secretary.

Department of Public Works,
Ottawa, 2nd November, 1885.

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OFFICE:

UNION CHAMBERS, 14 Metcalfe Street.

The CANADIAN MINING REVIEW is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts as well as others interested in Canadian Mineral Lands are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 20th of the month.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

Notwithstanding the valuable work that is yearly being accomplished by our Geological Survey, and the information that is being given to us in the Director's periodical report, it is incontrovertibly true that the people of Canada are practically without information and comparatively ignorant concerning the extent and variety of the mineral resources of their own country. Lack of information concerning the past history of our mining industries, and the continued neglect on the part of the Dominion Government to establish a mines branch in connection with the Geological Survey of Canada, for the systematic compiling of mining statistics and the publication of an annual report of mines, has a tendency to retard the progress of our mining industries and to perpetuate our ignorance of what might be achieved by enterprize and judicious use of capital in the development of our mineral deposits. There is much need of wider knowledge of Canada's mineral resources and a better understanding of their capabilities; for their successful development would become a potent factor in advancing our national prosperity. This knowledge and understanding can only be given to us through governmental interposure, and it is to be hoped that the Minister of the Interior will not delay in establishing a Department of Mines capable of liberally dispensing mining information.

Now that the shipping season for phosphate is drawing to a close, mine owners have ceased to forward ore from the mines,

as all the available freight from Montreal to foreign ports, per steamship and sailing vessels, up to the close of navigation, has been secured, and the phosphate awaiting shipment has been delivered at Montreal.

For this reason the Canadian Pacific Railway Company has seen fit to discontinue the running of trains on the branch line from Buckingham station to the village. This is certainly a most unwarrantable proceeding, and has created much dissatisfaction among mine owners in the Lièvre district, who have been liberal patrons of the C. P. R. By the carrying of the output of the phosphate mines over the road to Montreal, that portion of the freight charges credited to the Buckingham branch has shown it to be the best paying portion of the Eastern Division. This traffic can be relied upon for seven months in the year (the shipping season from the mines to Montreal) and the profits therefrom to the railway would warrant more liberality on the part of its managers than they are now displaying. Machinery and other heavy freight is constantly being forwarded to the phosphate mines, and at this season of the year mine owners are laying in their supplies. From the first of November of each year, until sufficient snow has fallen to make good sleighing, the roads between the railway at Buckingham station and the village are practically impassable, and at this very time, when railway communication would be of the greatest convenience to the miners, the company sees fit to discontinue to run trains over the branch. Had timely warning been given of this ungenerous intention, steps would have been taken to forward all heavy freight before the cancelling of trains; but no intimation of such discontinuance was given, until within a few days of its taking effect, and consequently everybody was unprepared for it. One train daily to and from Buckingham village could be run during the winter months at a profit, as the passenger traffic alone would be sufficient to defray the expense. During the season of navigation the company realizes large profits from this short piece of its line, and it is surely not asking too much of its managers in requesting that the order to discontinue the running of trains over the Buckingham branch be rescinded, and that thereafter there may be at least one train daily.

A meeting of representative phosphate miners of the Lièvre river district was recently held in Buckingham to protest against the action of the Canadian Pacific Railway Company in taking off the train between Buckingham station and the village. Mine owners are very indignant, and justly so, that their interests should be thus disregarded, and will take prompt steps to have their grievance favorably considered. The capital invested in the phosphate mining industry has reached large proportions, and the men who have interest at stake here are sufficiently independent not to allow themselves to be trifled with. Another meeting has been called, at which will be

discussed the propriety of constructing an independent narrow-gauge line from Buckingham village, on the west bank of the Lièvre, for the transportation of ore to the Ottawa river and thence to Montreal by barge. If their request to have a daily train over the Buckingham branch of the C. P. R. is not granted, these gentlemen will certainly provide for themselves this other accommodation.

An exchange tells us: "Graphite and black lead are identical, or nearly so, with plumbago. The mine at Ticonderoga, N. Y., produces nearly all the graphite mined in America. It is the purest known, and is used for all the purposes to which graphite can be put, excelling all others as a lubricant."

If Canada forms a portion of America, and we understand that such is the case, our contemporary is in error. There are two mines in the Province of New Brunswick producing graphite in large quantity as pure as any that has yet been found in other parts of the world, and the deposits of graphite in the Ottawa district are in no respect inferior to that produced in Ceylon or at Ticonderoga.

In this number of the *Review* we publish Mr. Edwin Gilpin's paper on "Nova Scotia Gold Mines," read before the Halifax meeting of the Institute of Mining Engineers, which will be found to be replete with interesting facts and statistics. Of the meeting, *The Engineer and Mining Journal* says:

"The recent visit of the mining engineers to Nova Scotia served to dispel many erroneous impressions. Not a few were surprised to find that Nova Scotia has a known coal area of nearly 700 square miles, or nearly twice the area of the Pennsylvania anthracite fields, and that some of the Nova Scotia fields have a greater thickness of workable coal than probably exists anywhere else in the world. The coal, too, is of good quality, though, when not washed, the slack and coke contain generally very large percentages of ash and sulphur.

The iron ore deposit of Londonderry is one of the finest in the world, and greatly surprised many experts. The country altogether is larger and better than was expected.

It was pretty generally believed that the climate of Nova Scotia was both cold and wet. This erroneous impression was thoroughly dissipated; for certainly no trace of coldness or frigidity was found anywhere to offset a warmth and ardour rarely equalled in any other part of the world the Institute has yet visited. As for the legend that in Nova Scotia the normal condition of the atmosphere is rain and fog, the visitors were convinced, both by personal experience and private information, of the contrary; for they found it a well established fact that the natives are always dry."

This speaks well for the natives. Their being *always dry* is, we take it, a reference to the hospitality they extended to their guests, and this is further corroborated by a special correspondent of the *E. & M. Journal*, who says:

"At New Glasgow we briefly examined the steel works, where steel is made from scrap and pig-iron, said to be the only steel works in

Canada; and the glass works, which make lamp chimneys, tumblers, wine-glasses, &c. Judging from our experience, we should say that Nova Scotia furnishes an extensive market for the last named article."

The same journal, referring to Nova Scotia's mineral wealth, says:

"Nova Scotia has been treated with great partiality by nature, which has heaped upon it with great prodigal hand, the choicest treasures of her mysterious laboratory. Gold, the sorcerer that bewitches the world; coal, the mainspring of civilization; iron ore, manganese, gypsum, and many other useful minerals are placed in large abundance within easy reach of man, in a fertile country with wholesome climate. In their proximity to each other and to magnificent harbors, nature has provided all the natural elements of national wealth and prosperity. The artificial elements, capital and energy, only have to be added to secure for this favored land an enviable position among the nations of the earth."

Such, it may be said, is the case in nearly every province of this Dominion. Our people are energetic, but we lack the enterprise and capital necessary to the advancement and successful development of great mining industries. The former can be fostered and nourished by the judicious employment of capital that must be looked for from more wealthy communities, and to procure this indispensable agent, we must offer sufficient inducement to capitalists to encourage them to come to our assistance, and we must be scrupulously careful to see that the capital that may find its way into Canada, for the development and advancement of her mining industries, is directed into channels where it can be profitably employed.

The South African gold field, of which many promising reports have been printed in London, according to Mr. Thomas C. Kitto, M.E., are really without a substantial trace of gold, and the geological formation of the country is not one that promises gold. The large nuggets that have been displayed there as of local origin have all been carried thither from Australia.

THE PHOSPHATE TRADE.

The shipping of phosphate for this season has virtually ceased—at least the forwarding of ore from the mines has been discontinued—and will not be resumed until the opening of navigation in 1886, excepting from those mines that are so situated as to necessitate winter transportation, and from these handling will be begun as soon as the roads are in good condition for sleighing, and the ore delivered at railway to await shipment next season.

At the mines in the Lièvre district nothing could be more satisfactory than has been the result of the past six months' operations. During the two months after the breaking up of last winter, the managers at the mines directed their attention to opening new ground in some cases, to adding new machinery in others, and in all cases to increasing and improving the facilities, and putting the mines in shape, for permanent and more extensive operations.

In consequence of this determination on the part of mine owners to prepare for systematic mining in the future, it became necessary to do a certain amount of dead work; but their wis-

dom has been amply evidenced by the increased monthly out-put since these improvements have been accomplished. Nevertheless, the time that had to be given to this work has had the effect of reducing the year's production of ore, and it is not probable that the shipments for 1885 will aggregate more than 23,000 tons.

The shipments of Phosphate during the past season from Canadian mines have given more satisfaction to the buyers abroad than have those of any former year, due, certainly, to the greater care of the mines superintendents in seeing that the ore is properly dressed and cleaned before it is forwarded. The quality of the past summer's shipments has been of a very high grade, the cargoes of first-quality ore having averaged quite 80 per cent. The richest shipments, however, that have been reported to us were from the *Little Rapids* mine, the return of which, from the London brokers, gave in one case 85.79 and in another 85.18 per cent. tribasic phosphate of lime. These are probably the highest analyses ever given for Canadian phosphate in cargo lots, but there is no reason why a very large proportion of the out-put of the mines should not be shipped in an equally pure state, though in some cases more than others it is more difficult to separate the ore from foreign matter which tends to lower the analysis. These shipments from the *Little Rapids* mine were made through Wilson & Green, of Montreal, and the result is evidence of their careful handling of the ore on this side, and that of their representatives on its arrival at London.

The most important development in mining during the past season has been at the Dominion Company's *North Star* mine, in Portland East, where a shaft has been sunk to a depth of 266 feet, the bottom of which is in a fine body of ore. From the surface to its present depth this shaft has penetrated ore, but the extent of the deposit has not been determined, nor will it be until drifts and cross-cuts have been run at different levels. At the 200 ft. level a drift has been run for some distance in solid ore, and some stoping has been done. We understand it is the intention to start another drift when a depth of 270 ft. has been reached. The present condition of the *North Star* is such as to insure a heavy out-put for many months to come. The ore is of a very high grade, and the way it has been handled, and the manner in which the work has been carried on at this mine, reflects much credit on Mr. W. H. Smith, the company's competent manager.

At other mines in the Lièvre district much lower depths have been reached than had ever been attempted before, and with very satisfactory results, and some important developments have been made at mines that have been but recently opened.

At the *Little Rapids* mine, during the past month, a cross-cut was started on a vein in one of the open cuttings, which has penetrated a body of ore, apparently another vein, the extent of which has not yet been defined. The miners are working in solid ore, which forms the roof, floor and sides of the drift. This work has exposed one of the largest bodies of phosphate ever met with in the district.

The *Emerald*, *High Rock* and the Union Company's mines maintain the reputation they have long since earned as heavy producers, and from each there is a steady production of high grade phosphate. The *Emerald* and *High Rock* mines have increased their out-put, month by month, since last year, and the October production of the mines in the Lièvre district has aggregated about 2,500 tons; the force of miners employed being much the same as reported last month.

The Glasgow Canadian Phosphate Company's mine, in Derry, has been developing satisfactorily and is producing a fair quantity of ore. This company has now put its mine in good working order, and has equipped it with machinery and other plant necessary for extensive operations. One of the directors of the G. C. P. Company (a Scotch organization) visited the property not long since, and expressed himself well satisfied with the prospects as he then saw them.

PHOSPHATE SHIPMENTS FROM MONTREAL FOR SEPTEMBER.

Date.	Vessel.	Destinat'n.	Shippers or Agents.	Tons.
Sept. 30	S.S. L. Superior	Liverpool..	Millar & Co.....	210
Oct. 3	S.S. Baumwall..	Hamburg..	Lomer, Rohr & Co.	780
" 15	S.S. Oregon	Liverpool..	Lomer, Rohr & Co.	250
" 16	S.S. Enrique	Liverpool..	Lomer, Rohr & Co.	15
" 16	S.S. Enrique	Liverpool..	W. M. Knowles..	200
" 17	S.S. Oxenholme ..	Liverpool..	Wilson & Green..	255
" 17	S.S. Oxenholme ..	Liverpool..	Lomer, Rohr & Co.	450
" 18	S.S. Concordia ..	Glasgow..	Wilson & Green..	207
" 19	S.S. Glenrath....	London..	Millar & Co.....	260
" 19	S.S. Glenrath....	London..	Lomer, Rohr & Co.	183
" 26	S.S. Maharajah..	London..	Wilson & Green..	273
Total for October				3,133
Previously reported				17,853
Total to October 31st				20,986

Phosphate Quotations.

One shilling for 75 per cent., with a fifth of a penny rise, has been the ruling price for Canadian phosphate in the London market during the past three months, and no report of any variation from these figures has reached us.

Ocean Freights.

The average freight charges for phosphate shipments from Montreal to Liverpool and London for the past season have been about five shillings and sixpence, having varied from three to seven shillings per ton. To Hamburg they have ruled at twelve shillings and sixpence. As the shipping season is virtually closed, there is no freight offering, and consequently no rates are reported.

The phosphate location in Templeton, adjoining the *Post* mine, formerly the property of Mr. J. H. Post, has recently been purchased by Mr. John Lamb, of Toronto, who purposes putting a force of men on at once to open it up, and will continue mining operations throughout the winter. Mr. Lamb is well satisfied with his purchase, and expects to make a good shipment of ore from the mine next season.

VILLENEUVE MICA MINE.

Recent reports from this mine are to the effect that it is producing a liberal quantity of excellent mica with but a small force of miners employed. Several experienced cutters are engaged, and find it impossible to keep pace with the miners; consequently there is a large accumulation of crystals, (in the neighborhood of eight tons) awaiting the cutters to prepare them for market. A shipment of several hundred pounds of cut mica was made from the mine in October, which has been pronounced by the consignee to be of as good quality as any that has ever been mined in America—quite equal to that which he has received direct from the North Carolina mines.

The drift, or tunnel, which is being run into the micaceous lode has reached a distance of 80 ft. from the face of the mountain and has opened up a body of mica-bearing quartz in which well

formed crystals are everywhere imbedded and are to be seen in vast numbers in all directions. This *Villeneuve* mine is certainly developing into a property of incalculable value, and ere long it will be capable of supplying almost the entire Canadian market, and it is not improbable that there will be a surplus to ship abroad.

Adamantine Shoes, Dies and Crusher Plates.

A visit to the *Chrome Steel Works* in Brooklyn, N.Y., was made recently by our correspondent, where were seen made the celebrated *Adamantine Shoes, Dies and Crusher Plates*, which are being extensively used in the gold and silver reduction mills, and wherever rock breakers are employed, in all the States and Territories of both North and South America, with the most satisfactory results. When it is understood that they outwear any other known, their value as compared with those of other materials may be computed. This is a large saving and



economizes not only in the freight, which is quite an item, as in many cases they have to be carried on the backs of mules over rough and mountainous country, thus adding greatly to the first cost, but in the trouble and delay caused in replacing those worn out, which, occurring at such short intervals, amounts to a considerable sum in time. They save also in the amalgam. The wear is so slight that little, if any, of the metal from which they are made gets mixed with the crushed ores, which saves the precious metals from a mixture of foreign materials. It is often the case that certain *Shoes* and *Dies* break off at the shank; these are made extra strong at that point, and there is no danger of their breaking.

The *Chrome Steel Works* are also manufacturing plates for amalgamating pans, from the same materials, which are destined to become very popular. There was also seen in process of manufacture the well-known *Chrome Tool Steel* made by this company. Their trade has increased wonderfully of late years, and now reaches over twenty tons per day. It is used for every description of tools. It is made of several grades, in rounds, squares, and octagons, and is guaranteed to do more work, as a tool steel, than any other known brand by from 50 to 100 per cent, according to work to be performed. We would refer our readers to the company's advertisement, which appears in another column.



A petrified tooth, twelve inches long and six inches in diameter, supposed to belong to a mastodon, has been unearthed in a gravel pit at St. Catharines, Ont.

GRANITE WORKS.

Ottawa has a new industry that is likely in the near future to prove of much importance. The Canadian Granite Company has completed the improvements and additions that were being made to the mill recently purchased at the canal basin, and the machinery, which has arrived from the manufacturers in the United States, is now being put in place. The polishing mill is a commodious structure, with excellent provision for light, and is substantially built from foundation to roof. The sheds in which the stone cutters will be employed in summer cover an immense area, and for the winter an excellent cutting shed has been provided for them adjoining the mill. The machinery is all of the most modern patterns, and of greater capacity than any now in use in Canada. The company's red granite quarry, at Kingston, has been described before in the REVIEW. It also owns a serpentine quarry convenient to Ottawa, from which very handsome stone can be obtained, and a marble quarry as well. The gentlemen composing the Canadian Granite Company possess the enterprise and business capacity to insure its success. They have shown their wisdom in securing the services of so competent a manager as Mr. P. A. Taylor, under whose supervision the works at Ottawa will be conducted. The polishing mill will be in operation before the end of the month, after which the company will be in a position to turn out monumental and architectural work of all conceivable designs, in granite and marble, and ornamental designs in stone of any description.

ASBESTOS.

The total shipments of asbestos from Canada for the season of 1885 will aggregate 1,400 tons, or thereabouts, and the prices received for the various grades have been very encouraging to mine owners. The principal operators have been King Brothers, the Johnson Company, Ward Brothers, Lionais & Company, Boston Asbestos Packing Company, and Irwin & Hopper. In the October number of the REVIEW the name of Kennedy & Co., was mentioned, by mistake, among the mine owners of the district. Mr. Kennedy is employed as manager of the mine owned by Messrs. Irwin & Hopper, of Montreal. The quality of asbestos from the mines in Coleraine, Thetford and Broughton is of a quality that is not excelled in any part of the world. We have recently seen blocks of the mineral of the very finest quality, from the Eastern Townships mines, some of which weighed nearly two hundred pounds, with the fibre not less than four inches in length. Those who are engaged in the asbestos mining industry express themselves well satisfied with the result of the past season's operations.

An asbestos mine exists on the spur of a hill about two miles from Gundagai, New South Wales, in which the lode has been driven upon for a distance of ninety feet, and a shaft 100 feet deep has also been sunk. The mineral occurs in a serpentine formation similar to quartz veins, and is mined in the same manner. The material is very abundant and is stated to be of as good quality as any in the world. The shareholders have started an asbestos manufactory, in which they propose to work up asbestos for various purposes, among others for the manufacture of a fire-proof paint. On the same property another class of asbestos has been discovered and worked in connection with gold. The lode is peculiar in character, and with one

or two minor exceptions is almost identical with the famous Lucknow lode, which has proved so rich in gold.

A NEW USE FOR ASBESTOS.—In the processes connected with the dyeing and printing of cotton cloth it is frequently necessary to hang the fabric in loops from parallel rods for the purpose of exposure to steam, air or ammonia. In order that the cloth should hold upon the rods without slipping or being strained, it is necessary to wind rope or strips of cloth around the rods; but this only mitigates the difficulty without accomplishing its removal; for the heat and corrosive action of the vapors rot any covering in a few weeks, and the first notice of any deterioration is generally the appearance of small pieces of roll covering among the cloth in process of finishing. Recently asbestos rope and asbestos cloth have been used for this purpose and prove to be very durable. Larger ropes of this refractory material have been used for the transmission of power over places exposed to heat.

MINERAL WOOL.—This material is nothing more nor less than the slag of blast furnaces converted into a fibrous state and, in appearance, resembles the fibres of fleecy wool or cotton, and for this reason it has been given the names of *mineral wool* and *silicate cotton*. It possesses excellent non-conducting qualities and is well adapted for all practical purposes to retain or exclude heat in connection with steam boilers, pipes or refrigerators, and is also useful as an incombustible lining or protection in cases which admit of its application. In many of the uses to which it is applied *mineral wool* serves the same purpose as asbestos, but does not possess some of the properties which make this latter mineral so valuable for the great variety of uses to which it is adapted.

In the next issue of the REVIEW will appear a description of the methods employed in the manufacture of *mineral wool* and more particulars as to the character of the article itself.

NOVA SCOTIA'S GOLD MINES.

By EDWIN GILPIN, A.M., F.R.S., F.R.S.C.

Read before the Halifax Meeting of the American Institute of Mining Engineers, Sept, 16th.

It has fallen to my lot on this occasion to endeavor to convey to your Institute an idea of our gold fields. I can assure you that I am quite sensible of the well capped apex of a smile when I speak of an annual production of gold valued at \$300,000 to an Institute whose members dig and refine annually over \$30,000,000 of the precious metal. But possibly before you leave us you will endorse the golden forecasts of our politicians and revivalists, and not only express yourselves in the words of one of your most eminent financiers that "there are millions in it," but also show us how to carry on our mining more profitable.

OUR GOLD FIELDS

stretch along the Atlantic shore of the province from Yarmouth to the Strait of Canso, a distance of over 200 miles, and is in some places forty miles wide. The country underlain by the auriferous strata and associated rocks is rough, and generally unfitted for farming, so that it is comparatively unexplored. The Geological Survey has begun to map out the district, but several years must be spent before a complete survey can be made. It is therefore difficult to give any exact estimate of the number of square miles underlain by the auriferous

measures. The total area has been estimated at from 6,000 to 7,000 square miles, about one-half of which is occupied by "granite." The exact age of these measures has long been a vexed question among the provincial geologists, and is perhaps not yet positively settled. They may be roughly divided into two sections. The upper one is composed principally of black slates, frequently pyritiferous, with beds of quartzite and veins of quartz. The lower section is made up of alternating beds of quartzites, fine and coarse and frequently feldspathic, and gray and bluish black slates, sometimes magnesian, and holds numerous veins of quartz. The thickness of the upper section has been estimated at 3,000 feet, and that of the lower section at 9,000 feet. The veins in the upper section, though frequently auriferous, have not yet proved of economic value. The following opinions as to their age are those advanced by Sir William Dawson, and appear, in the opinion of the writer, to be based on the only available data:—

CAMBRIAN.

England.	Nova Scotia and New Brunswick.
Tremadoc slates and Lingula Flags.	Mira and St. Andrews series in Cape Breton.
Menevian series.	Acadian series, St. John, N.B.
Longmynd series.	Acadian series, St. John, N.B.
Harlech grits and Llauberis slates.	Quartzites and slates of the Atlantic coast of Nova Scotia.

THE ACADIAN SERIES

of St. John, New Brunswick, so carefully examined by Professor Hartt, forms with its well characterised fauna the typical representative on the western continent of the formation known in England as the menenan of Barandé's etage C, of the primordial in Bohemia. The Atlantic coast series of Nova Scotia, with the two divisions of quartzites and clay slates so divided from the respective predominance in each of the rocks named, are considered by Sir William Dawson, Dr. Selwyn and Professor Hynd to precede these. It is to be regretted that hitherto the light thrown on the subject by fossil evidence has been of the most meagre kind. Dr. Selwyn has recognised in the Lunenburg slates markings of the nature of these named in Sweden, *Eophyton*. Sir William Dawson, however, considers them the trails of aquatic animals named by him *Rhabdichnites*, which are characteristic of the Acadian series. Professor Hynd discovered at Waverley nodular bodies and markings, which Mr. Billings referred with doubt to the genus *Eospongia* and casts of orthis. Dr. Dawson states that they may be compared with the problematical object from the Eophyton sandstone of Sweden, described by Linnarson under the name of *Astylospongia Rudrata*, but considers them fucoids with radiating fronds, and allied in form to Hall's *Phytopsis* from the birdseye limestone, or to Linnarson's *Scotolithus* from the Eophyton sandstone, and has given them the name of *Astropolithon*.

THE ONLY OTHER FOSSIL FORMS

observed are tubes from St. Mary's river resembling scolithus. So far as the above fossils give any information, they serve to confirm the supposition that the measures in question are to be referred to the Cambrian period. Within that period the fossils may be compared with those of the Fucoidal or Eophyton sandstones of Sweden, which underlie the equivalent of the Acadian series. They may, therefore, be regarded as probable equivalents of the Lower Cambrian or longmynd series of Europe. The "granite" rocks extend in irregular patches and belts throughout all the gold fields. So far as they have been studied in their relation to the auriferous and newer strata they appear to be intrusive masses. At Cochran's Hill, in the Sherbrooke district, the auriferous measures close to the granite are penetrated by veins of

granite from one inch to six feet in thickness, and have become highly metamorphosed. Sir William Dawson similarly describes the granite of Nictaux as altering the Devonian beds and converting them for a short distance away from the junction into gneissoid rocks holding garnets.

THE NOVA SCOTIA GRANITE

has all the characteristics of a plutonic rock in its want of stratification, its frequent porphyritic appearance, its passage into graphic granite, etc., and closely resembles in lithological characters the intrinsic granites of the eastern townships of Quebec and of New England, some of which belong to the Montalban series of Dr. Hunt, while others are later than the Upper Silurian; and it differs materially from the typical Laurentian of Canada. In the latter the gneiss is usually hornblendic, laminated and interstratified with diorites, pyroxene rock, limestone, serpentine, etc. The granites are older than the oriskany sandstone which they penetrate and alter at Nictaux. The auriferous strata are now presented to the miner in a series of undulations having a general east and west course roughly parallel to the trend of the shore. Wherever the anticlinal crests have been severely denuded, the upper division being swept away, the beds of the lower section are presented in concentric layers, forming four elliptical curves with north and south dips. In some cases the movement has caused an overturn and northerly dips only are seen. These denuded crests are sometimes two miles in width and several miles long. In these strata and pursuing a course parallel to them are found the veins, more particularly the subject of this paper. At the first glance they seem to be contemporaneous beds of quartz, and were so considered for some time. They, however, present the characteristics of veins such as "horses," country rock inclusions, banded structure, etc. In addition, feeders frequently radiate from them and connect two or more veins, and the veins themselves break across from bed to bed. I presume that we are to look to the forces which produced the great folds for

THE ORIGIN OF THE SPACES

now filled with quartz. The action which introduced the quartz possibly partook of the nature of a leaching out of the metallic constituents of the surrounding beds, and this idea is supported by the fact that the richness of the veins is frequently seen to be connected with the contact of feeders or cross veins which cut the encasing strata. The forces producing the great east and west folds, and possibly incidentally forming the spaces for the veins, were succeeded by numerous other disturbances. The effects of these are now chiefly shown in dislocations varying in amount up to many hundreds of feet both along and across the run of the strata and enclosed veins. These faults when running across the country rocks some times present large fissure veins frequently auriferous; and in the openings they make parallel to the measures are found false veins also sometimes auriferous, and frequently affecting the gold values of the veins they impinge upon. The exact date of the vein filling cannot now be determined. It may be said that it preceded the carboniferous period, for at Gay's River, in the county of Halifax, the lower carboniferous conglomerate (the basal rock of the carboniferous system) resting on slates, generally considered to represent the auriferous strata, carries water work gold.

A PARALLEL OF MODERN DATE

is now presented near Lunenburg, where the waves of the Atlantic are breaking up the

slates and concentrating the gold on the beach. In this connection it may be remarked that we have no regular alluvial workings. The surface soil of several of the gold districts is in my opinion quite rich enough to work, by sluicing and crushing. Several old river courses, and the brooks flowing from the gold districts, deserve exploration in a systematic manner, especially where they form small lakes or 'still waters.' The veins worked in this province vary in width from one-half an inch to six feet, the most common thickness being from four to six inches. The quartz is usually crystalline and fairly friable, but also oily and compact. The gold occurs in coarse sights and in minute grains and films in the associated pyrites. The miners rarely crush quartz unless it shows free gold. The minerals associated with gold are iron pyrites; mispickite, galena, copper sulphides and blends. Calcspar is also found, but in some cases it has been observed that the gold diminishes as the proportion of spar increases. Galena and copper pyrites are considered by many miners to hold out the best promise of economic amounts of gold. The veins afford many good examples of chimneys or pay streaks. It is to be regretted that no pains have ever been taken to map out these pay streaks, in order to gain information which might show some rule governing their mode of occurrence and extent. Their width, dip and downward extension are of the most varied form, and we have yet no rule beyond the caprice of the miner's goddess to disclose a clue to their whereabouts.

THE GREATEST DEPTH OF A PAY STREAK

that has been worked here is 600 feet, and a horizontal length of 300 feet may be considered a maximum. No attempt has yet been made to sink below an exhausted pay streak; although the fact of more than one having been observed at the surface in the same vein would show that the conditions favoring their deposition were not isolated. It is to be regretted that no attempts have been made to find out if such ore bodies do come in again at a lower level—for in many cases the pay streaks have become exhausted before a depth of 200 feet was reached. This problem once answered in the affirmative, there would be an inducement held out to more systematic mining—and fewer abandoned shafts and crumbling mills would dot the landscape. In several districts a zone from 300 to 900 feet wide has been observed extending across the general run of the measures. The veins in this zone do not appear to be affected in their gold values, but the enclosing slate and the irregular feeders found in them carry gold in amounts as high as 9 dwts to the ton. Several times considerable quantities of these low grade ores have been profitably crushed in small mills of 8 to 20 stamps, but

NO SYSTEMATIC ATTEMPT

has yet been made to work them on a large scale, and as a regular operation. In the opinion of many persons acquainted with our gold fields these low grade belts are well worth attention, and they consider that in the future they will prove highly profitable. In most of the gold districts the presence of valuable veins is indicated by surface boulders of auriferous quartz, and the labor of the prospector is frequently lessened by following them to the north along the course of the striation of the rocks. The boulders are carried various distances up to 1,800 feet, and in some instances the strike on the underlying rocks pointed like an arrow to the portion of the vein which yielded them to nature's great plough. The extent of the transportation of the quartz

boulders is limited and strongly marked, for outside the narrow belt lying south of a system of auriferous veins hours of search will fail to show a boulder yielding a sight of gold. Some years ago in a paper read before the North of England Mining Institute I drew attention to this local transportation and to its presence side by side with a more extensive system. At numerous localities through the auriferous district of the province are met hills and mounds having a general north and south course, and made up of clay mixed with gravel and boulders of every size and degree of attrition. Many of the boulders can be traced to the granitic ranges, often several miles distant, and the fragments of carboniferous and of later traps, and of sandstones resembling none now known here in measures older than the carboniferous, must have been carried over a far greater interval. These hills have been observed surrounded by and merging into the districts already alluded to as distinguished by auriferous veins and a detritus carried but a few yards. If the reason for this varying cover is to be sought for in a single cause, there must first have been in the district under consideration conditions permitting the deposition of material derived from distant sources, the principal condition being a depth of water; then with a rising land the impact of ice would give stirring and limited transportation; or else a more or less general covering derived from distant sources has, through a change of level, been subjected to a force gouging through it, and scattering fragments and masses of quartz and rock on the line of its impact. As I am afraid I have trespassed already too much on your time I will merely refer to

THE MINING AND MILLING SYSTEMS

of our gold fields. There is little novel about them, and they may, speaking generally, be described as rough and ready methods adapted to small veins and a corresponding capital. The shafts are invariably sunk on veins which dip at all angles, from 45° to the perpendicular; stopes are started at all depths and carried direct from the shaft, underhand, in steps, and part of the rock stowed on following scaffolds. Usually the vein is left standing on one side of the slope, and is taken down in lots of several tons at one operation. By this plan the ore is kept separated from the dead rock, and is less exposed to handling, an important item in coarse gold ores. Shafts are left at scaffold ends at frequent intervals, and through them the hoisting and pumping is done by every imaginative device an ingenious man can invent. Few shafts exceed 200 feet in depth, and the workings seldom extend much beyond the pay-streak. The mills claim no striking originality in pattern; one of the best in the province was built by Messrs. Fraser & Chalmers, of Chicago. The milling merits no particular notice, the dependence being on the amalgamation in the batteries by free mercury, lining plates not being used. Copper aprons and plates are amalgamated by hand, and many miners consider them better than any so called 'patent' arrangements. Exact figures of the amount of gold saved cannot be given. About 15 per cent. of the free gold is lost, and little of the gold held in the sulphides, etc., is saved. The amount of the sulphides, etc., varies from one to 60 per cent. in the quartz veins, and their gold values sometimes run \$4,000 to the ton, but I presume that from \$40 to \$50 would represent their average value. A few small lots have been concentrated and shipped to Swansea, but the problem of the tailings has not yet been solved in Nova Scotia.

THE COST OF MINING VARIES GREATLY

per ton with the hardness of the encasing rock and the size of the vein. It may be put down at 50 to 70 cents for the open cast low grade workings, and from 95 cents in narrow slate belts up to \$15 in narrow veins. The value of the ore crushed varies from 3 dwts. to 4½ ounces per ton; the average annual value has fluctuated between 10 dwts. and 1 oz. 2 dwts.; the total amount crushed since the year 1862 is, from official returns, 495,923 tons, yielding 366,976 ounces, an average value of about 14 dwts. In conclusion, I may remark that the gold ores are the property of the crown, and are leased for revenue purposes. The areas are 150 by 250 feet in size, and any number can be leased on payment of a fee for the execution of the papers. The royalty is at the rate of 2 per cent. on the gold, valued at \$18 an ounce, and is paid by the mill owner, who is obliged to take out a license and to make regular return of his work to the Mines' Department. The areas are bounded by vertical lines, and laid out as nearly as possible along the general course of the veins of the locality they are applied for. Attempts have been made to substitute the apex law, and other well proved distinguishing marks of the American mining law, but the department cling tenaciously to their old methods, and think there can be few changes except for the worse.

The Nova Scotia meeting was a memorable one, and, with the exception of the Colorado meeting, probably the largest, as it was one of the most agreeable, in the history of the Institute.

Tests of Coxheath (N.S.) Copper Ore.

"Coxheath," in a letter to *E. and M. Journal* of a recent date says:—

"Some ten tons or more of ore from the Coxheath mine, of Cape Breton, owned by the Eastern Development Company, were smelted at the Bay State Smelting and Refining Works, in East Boston, on the 6th and 7th of October.

The ore, which is reported to be the average run of the mine, consists of copper pyrites in a silicious gangue, accompanied by a small percentage of iron pyrites, and assayed between six and seven per cent. But the peculiar interest of the test arises from the fact that both the fuel and flux, consisting, respectively, of coke and limestone and iron ore, were all brought from Cape Breton, being the same as would be used in smelting on the spot.

The run was made under the management of Dr. E. D. Peters, in a blast furnace belonging to the works, and produced a *matte* assaying about 38 per cent. of copper, while the slag carried less than one-third of one per cent. of that metal. The present aspect of the copper market offers little encouragement for the development of new copper enterprises; but with coke at 75c. a ton, and labor and fluxes at very low prices, it certainly seems that copper can be produced about as cheaply at Cape Breton as at any place on the continent, provided the quality and quantity of the ore supply are satisfactory.

Dr. Peters reports the *matte* free from all deleterious substances and certain to make copper of excellent quality.

Quite a number of Boston gentlemen interested in copper matters visited the works during the two days' run of the little cupola-furnace and expressed much satisfaction at seeing such

a fair test of the quality of the coke and the suitability of the fluxes."

If the quality and quantity of the ore supply is satisfactory, and the developments at the *Coxheath* mine prove that it can be relied on, it would appear that everything is favorable to the successful and profitable production of copper in Cape Breton.

EL CALLAO.

This South American gold mine for the eight months ended with August, 1885, has shipped gold to its London bankers and paid monthly dividends as follows:

	Product.	Dividends.
January	\$166,000	\$103,000
February	175,000	103,000
March	150,000	64,000
April	175,000	77,000
May	135,000	51,000
June	150,000	64,000
July	208,000	77,000
August	205,000	77,000
Totals.....	\$1,559,000	\$616,000

EL CALLAO, in the State of Guayana, in the Republic of Venezuela, is assuredly the most productive gold quartz mine in the world. Its product between 1875 to 31st December, 1884, amounted to \$10,526,000. Last year the value of the gold shipped to London was reported by its bankers at \$3,475,000, and this year, to include August, as will be seen by the above statement, the shipments have been valued at \$1,559,000. From 1879 to 1881 the average yield of gold was three ounces per ton of quartz milled; in 1882 it was 4½ ounces; in 1883 six ounces; and in 1884 as high as seven ounces. Of course, such a mine has paid handsome dividends upon 32,000 shares into which the property is subdivided. Last year the dividends aggregated \$1,932,000, or \$8.60 per share.

Another productive quartz mine in the same field, says the *Financial and Mining Record*, in a recent article, "Venezuela as a future source of gold supply," is the Chili, also the Potosi, the Nacupai and the Venezuela, Panama, which four properties employ 190 stamps, though, assuredly, not to such profit as El Callao, but in the aggregate have produced in 1884 \$1,150,000. One great drawback is the remoteness of this promising gold field. As described by an English Australian miner who has recently visited them:

"They are situated on the south bank of the Oronoco river, about 250 miles up from the English island of Trinidad, and 130 miles inland from the landing place. As the crow flies they are about 300 miles from Trinidad, and about 130 miles from Demerara; yet the bad policy of their Government compels you to travel nearly 600 miles from Trinidad to reach the fields. The first and nearest port on the river to the gold fields is Las Tablas; the steamer stops here four hours to land mail and take in passengers, but passengers going to the gold fields are not allowed to land there. The Government and their confederates (the shopkeepers) must first pick and fleece them all they can by compelling them to go 100 miles further up the river to the old Spanish town of Angustora, Bolivar. Then they must purchase another passport and pay another passage down the river to Las Tablas. From this place to the fields the road is good and very level nearly the whole distance (130 miles), yet you are charged from \$250 to \$300 per ton for freight. I came down the whole distance in a two-mule cart in 28 hours. There are about 7,000 people on this field; 6,000 of them are the native race of the

West Indies, and about 1,000 Corsicans and Germans. The whole of the mining work on this field is done by colored people. The miners get 4 pesos per day of six and eight hours, which is \$3.30 of American money."

The same miner remained at the mine, he states, for three months and examined it thoroughly in all directions, finding scores of quartz veins that had never been prospected; also many alluvial tracts formerly worked but left idle at present owing to the high wages given by the working companies which take up all the good labor, for the natives will not work. We also append the prices of food which he gives: tea, \$2 per pound, sugar 50 cents, butter \$1, cheese 75 cents, ham 75 cents, beef 16 cents, and bread 31 cents per pound, \$20 per barrel of 65 lbs.; salt pork \$20 per barrel of 65 lbs. Bass' ale \$1 per bottle and brandy \$2.50. Indian corn 25 cents per quart, and clothing 300 per cent. dearer than in England. He adds:

"After all I have seen of this field I think it will yet prove itself to be one of the richest and most extensive gold fields in the world. There seems to be no end to the reefs in these mountains; but the Government must try to be a little more liberal to the capitalists who are willing to risk their capital to develop the gold mines of Venezuela. At the El Callao mine there is a strong detective force traveling around the mine night and day, underground and at surface, each one having a revolver slung round his neck."

GOLD VEINS IN WALES.

Mr. W. Lewis, in a recent letter to the *Financial and Mining Record*, says:—"There are many in this country not aware that there are any gold mines in Wales, or that the Welsh people have had experience in gold mining in their native country."

As one who was there for years as second superintendent in charge of one of the leading gold mines in Merionethshire I can testify that I have seen as rich ore taken out there as any I have seen in America.

When I left for this country, in 1863, the following mines were in operation and producing well:—

The Vickre & Clogan mine was considered the first on the list; it has been worked more extensively than any of the others. The vein was quartziferous, containing small amount of bismuth, galena, and bi-sulphuret of iron, and varied in width from two to four feet—product about 15 dwts. of gold to the ton, although some of the ore was much richer than was selected and treated in amalgamating pans, on small scale the result from these pans was astonishing. The Cambrian mine was in full bloom. The ore of the Prince of Wales mine was more refractory than the commoner of the veins there; but as they concentrated the tailings and shipped it to Swansea, the mine paid handsomely for years. The Foel and Cefn Coch were also in operation, and several small mines in the Gamlwyd are working with good results and the reports from Gwynfynydd were very flattering.

The formation of the country that these auriferous veins traverse is the silurian rock, which is very fossiliferous in some parts there. The Cambrian group also makes its appearance on the northeast boundary of the silurian."

The Russian papers confirm the statement that gold has been discovered on the Chinese side of the Amoor, and thousands of Siberian gold-diggers have gone to the spot.

GOLD MINING IN MICHIGAN.

Announcement was recently made of the discovery of a vein of gold-bearing sugar quartz on section 35, town 48, range 28 west, Michigan. The property on which the discovery has been made belongs to the Lake Superior Iron Company. The correspondent of the *Detroit Free Press* says that this gold boom is no heedless clamor of inexperienced men. The men who are backing it are miners of experience. Assays have been made which show well. Average pieces taken from among the best specimens gave \$8,965 in gold and silver, nearly all being gold. These choice specimens varied in weight from six ounces to as many pounds, and this was their average value. The second assay was made from the leanest piece of quartz which could be found in the rock taken from the vein. In this there was no free gold visible to the naked eye or distinguishable with the aid of an ordinary prospector's pocket glass. It gave \$62.64 to the ton, nearly all in gold also. It is stated that a vein of this quartz four feet wide has already been traced over 700 feet.

VICTORIA (Australia) GOLD FIELD.

The yield of this field is officially reported for the second quarter of 1885 at 185,037 ozs. 15 dwts. 10 grs. as against 192,438 ozs. 11 dwts. 15 grs. for the March quarter, and making the half year's product 377,476 ozs. 7 dwts. 1 gr. The product for the half year may be set down at \$5,549,000.

The gold yield of Victoria continues to decrease, that for the quarter ended June 30th being less than the corresponding quarter of any year since 1876. The decrease is chiefly in alluvial mines. The yield is increasing in quartz mining and great depths have been reached—Lansell's 180 mine, Sandhurst, having attained a depth of 2,041 feet, the deepest shaft in the colony.

The quantity of quartz crushed during the last quarter reported above, was 211,643.3 tons, averaging 10 dwts. 8-9 grs. in gold per ton. No district averaged as much as one ounce per ton, and the lowest average for a large quantity was 7 dwts. 10-9 grs.; in the Ararat district 8,586 tons averaged but 4 dwts. 9-4 grs. The pyrites and blanketings treated amounted to 1,509 tons, with an average yield of 2 ozs. 1 dwt. 15-78 grs. per ton; and 8,785 tons of quartz tailings and "Mullock" yielded but 1 dwt. 11-88 grs. per ton.

The official reports show that the gold mining industry is not in a booming condition, though no less than £189,059 19s. 4d. were paid in dividends during the quarter ended June 30th, which means that about \$5 were paid in dividends for each ounce of gold produced, or 25 per cent of the gross product—a creditable showing on ores yielding as low as \$10 per ton.

QUEENSLAND (Australia).

Two quartz mining districts of this part of Australia, produced for the seven months ended July 31st, 1885, as follows:—

	Ounces.	Value.
Charters Towers.....	77,422	\$1,548,000
Gympie.....	50,182	1,003,000
Totals.....	127,604	\$2,551,000

THE GREAT NORWEGIAN GOLD-BEARING QUARTZ VEIN.—In one of the galleries of the *Oscar* gold mine, on the Bömnel Island, on the west coast of Norway, a block of auriferous quartz was recently broken out, the value of which is estimated at £70,000. The deposit has now been worked for a year and a half, and the working has, according to the reports of the

owners, already returned the sum invested. The work is pushed on with all dispatch, and it has been found that the quartz increases in gold downward.

The Gold Product of the World.

The world's production of gold for the year 1884 is estimated, in round numbers, by the *Financial and Mining Record*, as follows:

United States.....	\$25,500,000
Russia.....	18,000,000
Australia.....	24,500,000
Venezuela.....	4,400,000
Colombia.....	3,000,000
Mexico and other Spanish American States.....	1,500,000
Austria and Hungary.....	1,000,000
Africa.....	1,750,000
Canada.....	1,250,000
European States.....	500,000
Japan and Brazil.....	850,000
Total.....	\$82,250,000

As for the consumption of gold in the industrial arts alone, during the last nine years, it has averaged annually, at least, \$60,000,000, as a little investigation must show. The director of U. S. mints in his last annual report placed the amount of gold consumed during 1883, by India (\$18,965,635), the United States (\$13,000,000), France (\$11,000,000) and Great Britain (\$10,000,000) at \$52,965,635, out of a total gold production for that same year that did not exceed \$86,000,000.

The Way Mines are Sold in England.

It will be interesting to our readers to know to what extent swindling has attained in connection with the sale of mining properties to English capitalists, and the *modus operandi* employed by the professional manipulators to dispose of worthless properties at fabulous prices, or to effect sales of mines at figures that are out of all proportion to their intrinsic value. The *N. Y. Engineering and Mining Journal* makes a praiseworthy effort to enlighten unsuspecting and unsophisticated investors by publishing the following:

"The process by which the public on this side of the Atlantic is inveigled into investing in worthless mining schemes are nefarious enough; but they have not been systematized and codified, so to say, as have been the methods in vogue in England, nor is the formation of public companies here reduced to so exact a science as on the other side.

Among the congressional documents for the year 1876 is a bulky volume that exposes those methods. It contains the history of the sale of the Emma mine in London. This is an old story, but worthy of repetition; for it is constantly re-enacted by different people with only slight differences of detail.

The Emma silver mine, in Utah, had begun to yield profits in 1871, when, as usually happens in the west, claimants to the property at once sprang up to contest the title of the occupants. In the Emma case, litigation ceased on the understanding that the mine should be sold and the profits distributed in stipulated proportions. Mr. Lyon, who claimed a one-third interest, agreed to take \$500,000 for his share. Mr. Trenor W. Park, the largest owner, and Hon. Mr. Stewart, acting as counsel for Lyon, went to London. For some months previous as much ore as the mine could be stripped of had been sent forward and sold in England with as much publicity as possible. Arrived in London, Messrs. Park and Stewart were introduced by a banker, who is always a prominent member of such bands of conspirators, to Messrs. Coates and Hankey, brokers. The terms of the plot—for it can hardly be called

a sale—were now arranged; but Messrs. Coates and Hankey, being too weak to carry them out, resigned in favor of Albert Grant, the most astute company-monger of the age.

When once a broker undertakes a job of this nature, he becomes arch-conspirator. Vendors and all others are expected either to be quiescent or to obey his injunctions, and to say and do, without question or compunction, what he commands. The broker finds directors, concocts the prospectus, fees newspapers, manipulates the stock, and generally, as *deus ex machina*, makes what is worthless appear as of untold value, and a swindling extortion looks like a generous gift to the public. When, however, a man as notable or notorious as Baron Grant is secured, he never appears upon the stage.

In the Emma affair, Grant was fortunate in having the assistance of two such able and skilled operators as Park and Stewart. While he selected names for his long list of available directors (all prominent brokers are supposed to have at command a number of influential directors' familiarly called 'guinea pigs,' including a fair sprinkling of M.P.'s and of needy noblemen, to whom the fees are a consideration and who are too ignorant to be inquisitive), Messrs. Park and Stewart went in search of a man ostensibly to protect the interests of the American shareholders of the company, and by a happy accident they secured the services of the American Minister.

Having selected a strong board of well known men, whom the unwary public supposed to be heavy investors, but who, in fact, besides receiving a salary of £500 a year each, had been duly qualified by a donation of stock, the prospectus was issued. The property, which by transactions among themselves the sellers had valued at \$1,500,000, was offered at \$5,000,000. A dividend of $1\frac{1}{2}$ per cent. a month, equal to 18 per cent. on the capital, was guaranteed, and was to be paid out of resources on hand and out of ore in sight, said to be of the net value £357,750. The public, however, were not informed that of the £1,000,000 they were asked to give for the mine, Baron Grant, of whom they had never heard in that connection, was to get, as his fee, almost as much as the mine was deemed by the vendors to be really worth; that the lawyers, who drew up the prospectus so cunningly that the public would have no redress when they should discover themselves swindled, were to receive a comfortable fortune; and that the bankers, who had merely introduced Messrs. Park and Stewart to Messrs. Coates and Hankey, were to have what would serve many a small banking firm as capital; that the brokers who had been too weak to engineer the scheme should receive, nevertheless, a consideration for handing it over to the baron; and that even the metal brokers who had previously sold the ore on a good commission were to be richly recompensed for the loss they might sustain should they not continue to be employed by the new organization. These and other equally significant facts were kept carefully concealed; the public rushed to subscribe, and the amount demanded was offered twice over.

The subsequent history of the mine is curious. Although the public paid £1,000,000 for it, not a farthing was reserved for working capital. The mine was productive when purchased, and the ore on hand was sold with the mine. Enough, therefore, was extracted to pay working expenses and twelve $1\frac{1}{2}$ per cent. dividends. A thirteenth was paid, but the amount was borrowed from Mr. Park on the security of the ore in transit. The ore did not cover the advances, and the company remained in debt to Mr. Park. There being no more productive

ground within reach, and no money wherewith to make explorations, mining was stopped and litigation begun, for which stockholders were willing to furnish the means, though they had declined subscribing a penny for exploratory work in a mine that had apparently yielded £180,000 profit in a twelvemonth.

When such large sums are realized with so little labor, of course the broker can afford to be liberal, and to throw about thousands of pounds more lavishly than most men would their pennies. Thousands are used to bribe newspapers, a fact proved in a court of justice to the disgrace of British journalism; bankers are paid to lend their names; brokers in all parts of the kingdom are paid to make fictitious bids for the stock; men in the highest standing in the community are paid to serve on the board; and when the trap to catch the public has by such means been well baited, prospectuses are showered over the kingdom by hundreds of thousands, and are supplemented by special articles of leading newspapers. One copy is sure to reach every widow with a small income, and every needy clergyman. Both these classes being pinched for means and credulous, are liable to be tempted to buy shares. The broker counts that among so many hundred thousands there is sure to be a given proportion of fools who will be duped; therefore the more dubious the speculation, the greater the number of prospectuses, and the more extravagant the promises.

Carlyle classified the population of Great Britain as 'forty million, mostly fools,' but the great English promoters have graded the British fools according to degrees of gullibility. They have in their offices bookcases filled with bound volumes containing a directory of the whole kingdom, every possible subscriber, male or female, taking rank either in a small upper class *a*, if possessed of both wealth and penetration, or in one of the large lower classes, *b*, *c*, etc., which comprise the credulous and needy. A very small edition of a prospectus privately issued to class *a*, offering a sound investment, insures its acceptance. But an issue of half a million prospectuses, bulky as a volume, may be necessary to catch enough credulous subscribers of small sums to yield the grand total. Thousands and thousands of dollars are spent on printing and postage. The risk is therefore great, but the stakes are heavy.

There can be little doubt but that this system of raising joint-stock companies and afterward so manipulating them as to conceal the fraud, to which all concerned have been knowingly or inadvertently parties, has done more than anything else to corrupt commercial morality in England. The chief conspirator, the broker, may be the chief criminal; but the man who bonds to him knowing that he will use his property to perpetrate a fraud, is not innocent; the director who accepts qualification shares, which he is supposed to have paid for, or who sells or lends his name to be used to assist in floating an enterprise on more or less false or fraudulent statements, of the character of which he is aware or even willingly ignorant, is an accomplice to a swindle, whatever his title may be.

Even if the property be intrinsically good, when sold above its value and all the money subscribed has been grabbed by the broker and his satellites, so that little or nothing is left to develop its resources, it may become unprofitable; while if it prove valueless, a stigma attaches, not only to those who sold it, but to the whole community where it is situated.

This is an outline of the manner in which a vast number of mining properties situated in all parts of the world have been sold in London,

and the English palate has become so accustomed to these highly seasoned prospectuses, lies and exaggerations that it is said, by those who are well informed on the subject, to be almost impossible to sell a mine in London at a fair and honest valuation. Under these conditions, it is not at all strange that English investors in mines, for the most part, lose their money; it is almost a miracle when, through extraordinary richness, the mine withstands this method of floating and the additional load of the usual English management sent out by such a company, and pays a fair return to its stockholders."

MINING NOTES.

NOVA SCOTIA.

The Oxford Gold Mining Company has declared a dividend of two cents per share.

At the last cleaning up at the Cowan mine, Yarmouth, 9 tons of quartz produced 53 ounces of gold.

The discovery of a valuable seam of coal on the banks of Salt Spring Brook, near London-derry, is reported.

Advices from Boston are to the effect that public confidence in Nova Scotia mining enterprises is fast being restored.

A New York firm has purchased a manganese property in Colchester County, near Truro, and will proceed at once to develop it.

The output of coal at Spring Hill, for the week ended the 10th October, was 330,000 tons, the largest on record in Nova Scotia.

It is reported that rich gold bearing leads have been discovered near Calidonia, which may prove to be as important as any in the province.

It is not unlikely that the Renfrew Gold Mining Company will declare a dividend in November, but no mention has been made of the amount.

The final clean-up at the New Albion Gold Mine, for September, produced another bar of gold, making the total product for the month 1,369 ounces.

An argentiferous galena deposit discovered at Ohio, Antigonish county, will be developed by a syndicate composed principally of gentlemen of New Glasgow.

New steam-hoisting gear has been added to the machinery at the Albion mines, Montague. The owners of this property, during the month of September, netted a profit of \$21,000.

Coal miners in Nova Scotia have arrived at the conclusion that the Government will have to forego the royalty which is proving too serious a tax on the coal mining industry.

A subscriber to *The Critic* reports to that paper that the largest and most promising gold-bearing quartz vein ever discovered in the province has been uncovered in the Gold River District.

Some specimens of copper taken from a mining property on the Granville side of Digby Gut, Annapolis county, by Prof. Ken-

nedy of King's college, have proved, by analysis, to be rich in copper.

The September yield of the Archibald and Motts gold mine was \$8,000. The lead extends nearly two miles and is two feet wide, seven hundred feet of which has been opened, and it is found that the vein improves in richness and width in descending. One hundred men are employed.

The Block-house Coal Mine at Cow Bay, Cape Breton, was to have been sold on 28th October, for non-payment of \$12,000 taxes due the Government. The total liabilities of the mine are said to be about \$200,000, and the value of the property has been estimated at \$400,000.

In the Supreme Criminal Court at Halifax, in the trial of Smith & McLeod, for "salting" a gold mine at Chezzetcook, which they afterwards sold to a company formed in New York for a good price, the jury, on the 17th October, rendered a verdict of guilty. An appeal will probably be made, and meanwhile, McLeod and Smith have been admitted to \$6,000 bail.

The Acadia Coal Company, the Halifax Company (Limited), and the Vale Coal, Iron and Manufacturing Company, whose principal offices are respectively in New York, London and Montreal, consolidated on the 16th October, at a meeting of the different managers held in New York, and will be operated from Nov. 1st under a temporary board of directors. The Intercolonial Coal Mining Company has been asked to enter the syndicate and will probably do so. The scheme was inaugurated by Sir George Elliott.

The annual meeting of the Cumberland Railroad and Coal Company was held in Montreal last month, at which the following directors were elected: John McDougall, G. A. Drummond, R. Cowans, R. G. Leckie, L. A. Senical, D. Morrice, J. S. Clauston, James Corssen, C. C. Colby, M.P., Stanstead, and J. B. Renaud. At the subsequent meeting of the directors, officers were appointed as follows: John McDougall, President; R. Cowans, Vice-President; R. G. Leckie, Managing Director; J. R. Cowan, Secretary.

NEW BRUNSWICK.

The Markhamville Manganese Company has made a shipment of two hundred tons of ore to Liverpool.

A company is being formed at Dorchester to mine and reduce copper, gold and silver ores and minerals, with a capital of \$500,000.

QUEBEC.

The Phosphate mines of the Lièvre district, Ottawa County, have produced 2,500 tons during the month of October.

Operations for this year will soon cease at the asbestos mines of the Eastern Townships, as mining cannot be successfully continued during the winter months.

Late shipments of mica from the Villeneuve mica mine have surprised some of the dealers who were not aware of the existence in Canada of anything approaching it in quality.

The last day's washing from the St. Onge company's shaft on Slate creek, Beauce, that has been reported to us, produced $9\frac{1}{2}$ ounces of

coarse gold; some of the nuggets weighing from $\frac{1}{2}$ oz. to 1 oz. 12 dwt.

Work has been suspended for some time past at the Bristol iron mine, in the county of Pontiac. The property is owned by the Roberts' Iron Company, of Charlotte, New York State, and the suspension of operations is owing to the death of Mr. Roberts, its President.

St. Onge Gold Mining Company is doing good work on Slate Creek, Beauce, and is washing a large quantity of gold. The gravel that is now raised from this shaft is very rich in coarse gold, and many large nuggets are constantly found. The company, during the past month has been giving attention to the erection of buildings and machinery, and is now fairly equipped for permanent work.

ONTARIO.

The New York gentlemen who had been prospecting a copper location in Drury Township, on the line of the Algoma branch of the Canadian Pacific Railway, have abandoned it and relinquished their lease on the recommendation of their manager who scouted the probability of finding copper in paying quality in the formation of the locality. It is stated that this same manager made application for adjoining locations and went to not a little trouble before he succeeded in securing one. It is not unlikely he will now change his opinion of the geological features of the district. Those who know whereof they speak pronounce this abandoned location to be a most promising property and one that would develop into a valuable copper mine in the hands of competent miners.

Thunder Bay District.

Port Arthur District has made its first shipment of marble for monumental purposes.

It is expected that a shipment of ore will be made from the *Silver Creek* mine before the close of navigation.

Last month a consignment of machinery was shipped to the Rabbit mountain mine and work will be immediately started on ore.

Machinery necessary for further development of the Silver Mountain mine has been ordered. Cross-cutting is still progressing at this mine, and work in the tunnel is going on favorably.

E. N. Riotte, manager of the New York Metallurgical Works, with other gentlemen, visited the Port Arthur silver region during last month. Mr. Riotte is interested in a location at the west end of Silver mountain.

The *Huronian* gold mine is working day and night shifts and the mill is doing good work. The ore in both levels from the original shaft, and that from the shaft started on the recently discovered vein, is averaging an ounce of gold to the ton and a fair quantity of silver.

One of the Cleveland company engaged in testing the Silver Mountain mine arrived in Port Arthur from the mine last month and reported that the new strike in the lower tunnel of the Beaver mine is rich in silver. At this mine they are working three shafts and making good progress.

BRITISH COLUMBIA.

Williams Creek, Cariboo District, afforded as rich gold-diggings as any in the world, and yielded \$45,000,000 in gold from its bed and banks.

The news from Lorne Creek mines is very discouraging, and miners are leaving the diggings in numbers, being thoroughly disheartened.

Rich specimens of gold-bearing quartz have been found in the Semilkameen district, and iron ore has been discovered a few miles off the Hope trail.

The Tularmen river, in the vicinity of Granite Creek, embracing an area of about 50 square miles is being explored, and is thought by practical miners to hold out encouraging prospects.

A new creek has been struck in the Semilkameen valley, and it is now known as Bear Creek. It is said to hold out good prospects, and miners are already at work in considerable number.

A correspondent of the *Mainland Guardian* says there is, no doubt, some gold in Granite Creek, but not sufficient to warrant a man in leaving other employment to go to the diggings. Mining is practicable in but a few places and only at very low water.

At Cariboo, in the years 1861-62, provisions could scarcely be had at any price—freight being \$2,000 a ton. It is not strange that with labour at \$16 for an eight hour shift, and flour at \$150 a barrel, few of the many who went to those diggings brought out with them as much as they took in.

There are now upwards of 1,000 men in the Granite Creek district, and contradictory rumors are current as to their prospects. Some Montana miners pronounce the "Granite" the best creek they have ever been on for good, even pay. The gold is obtained by wing-damming the bed of the creek.

The *Island Sentinel* says: The Semilkameen gold fever is spreading, but, while some wonderful stories are printed and crowds are rushing to the diggings, we occasionally see parties coming this way from the Semilkameen. While listening to reports we can hardly reconcile the action of parties leisurely leaving the mines, even for a short time.

The deposits of auriferous black sand on the North Coast of Vancouver are very extensive. If the report from Oregon of the discovery of a method for saving the gold be confirmed, these deposits will become very valuable. Attempts to separate the gold have hitherto proved unprofitable, but it is stated that by this new process 95 per cent. of the gold contained in the sand can be saved.

UNITED STATES.

California, from 1849 to 1861, produced about \$700,000,000 in gold.

During the past thirty-five years the product of gold and silver in the United States alone has been \$2,246,000,000.

\$70,000 in gold, the result of 15 days' work at the Tradwell mine on Douglass Island, Alaska, was forwarded to Victoria, B.C., in September.

The Plymouth Consolidated G. Mining Co., California, paid a dividend on the 5th of October of fifty cents a share, aggregating \$50,000. With that dividend this property will have paid the stockholders \$14.50 per share.

The Calumet and Hecla Mining Company declared a dividend of \$5 a share, or \$500,000 on the capital stock, payable November 2nd. This makes \$17 a share paid this year, and a total of \$28,850,000 divided among the stockholders to date.

The Griffin Pulverizer Company.

This Canadian enterprise was referred to by the *Eureka Sentinel*, Sept. 26, attention being directed to the organization of a company in Montreal, under the above title, in the following paragraph:—

"Some time ago mention was made in these columns of the Griffin pulverizer, a new invention which, if it accomplishes what its owners believe it able to do, and if no unforeseen difficulties are encountered by it when put to work, will prove a great acquisition to the economical working of ores in the West. The patentee is a brother of W. E. Griffin, Wells, Fargo & Co.'s agent at this town. From an exchange we learn a company known as the Griffin Pulverizer Company has been organized, with a capital stock of \$50,000, with headquarters at Montreal, Canada. It is intended to manufacture machinery for the pulverizing of phosphates and ores generally."

In connection with the foregoing the following notice appeared in *The Canada* (official) *Gazette* of November 7th:—

"Public notice is hereby given that, under 'The Canada Joint Stock Companies' Act, 1877,' letters patent have been issued under the great seal of the Dominion of Canada, bearing date the 6th day of November, 1885, incorporating Alexander W. Morris, manufacturer, Robert C. Adams, gentleman, and Chas. B. Morris, gentleman, all of the city and district of Montreal, in the Province of Quebec, in the Dominion of Canada, and Edwin Packard, gentleman, and James R. Griffin, patentee, both of the city of Brooklyn, State of New York, United States of America, for the purpose of the manufacture and sale of machinery for the pulverizing of ores, phosphates, quartz and other hard substances throughout the Dominion of Canada, by the name of 'The Griffin Pulverizer Company,' with a total capital stock of fifty thousand dollars, divided into five hundred shares of one hundred dollars."

"Dated at the office of the Secretary of State of Canada the 6th day of November, 1885."

In the list of incorporators of this company we are pleased to see the name of Robert C. Adams, who is so well and favorably known among operators in the Canadian phosphate industry. The company has our best wishes for a successful career.

A HAND CRUSHER.

A convenient little hand crusher, for use in laboratories, is manufactured in San Francisco. Both jaws are faced with hard white iron, the lower parts of which are plain surfaces, and between them the ore is crushed. An ingenious arrangement of corrugations forces the ore down at each stroke of the lever, and the whole can be quickly taken apart for cleaning after each lot is worked. The lever has a rubber covering where grasped by the hand, and a rubber cushion where it strikes the bed-piece to prevent jar and noise. The height to which the lever can be raised is regulated. The jaws are 3 inches wide and open at the top

1½ inch, consequently, a piece of rock 3 x 1½ inches can be crushed. With the lower part of the jaws set at one-tenth of an inch apart, 40 pounds of the hardest rock can easily be crushed in one hour, and 20 per cent. of this will then go through a No. 60 sieve. Then the machine is set closer and the remainder is run through. This hand crusher is very complete and is not expensive.

A Possible Future Market for American Iron and Steel.

There are strong influences at work that are quite likely to lead the Chinese Government to begin the construction of an extensive system of railways with a view to provide for military exigencies as well as for commercial ends—military exigencies to grow possibly out of the habitual tendency of Russia to trench upon the territory of her Oriental neighbors. It is reported that the plan for such a system of railroads has been so far advanced that already the Chinese are negotiating for the means in Europe for its execution, and it seems to us that with such a plethora of idle money as there is, such a government as that of China should have no difficulty in placing a loan to be thus employed to ends that are creative and not destructive.

In that event, a demand for a vast quantity of iron and steel will be created which, with proper management, should be turned to the material advantage of our iron and steel industry. We certainly should be able to compete favorably with Europe in a very great deal of the material and appliances used in the building of Chinese railroads. Every exertion should be made in this country to win a liberal share of the industrial advantages to the West that are sure to be the result of an extensive construction of railroads in China. — *F. & M. Record*.

Work of the London Mint.

The recently issued report of the Deputy-Master of the Mint, giving an account of the operations of that department for the year 1884, is a more than usually interesting document. From it we learn that the amount of gold coined during the year exceeded by more than a million the amount coined in 1883, while the silver coinage was but little in excess of the average. The coinage of bronze, however, was larger than in any year since 1875.

The total weight of metal melted down during the twelve months was 470 tons, made up as follows: A certain proportion of alloy being of course included—gold, 67 tons; silver, 198 tons; and bronze, 205 tons. The total number of coins struck out of this metal was 65,295,382, giving an average of more than 1,200,000 pieces per week throughout the year. Out of these, however, 8,932,081 pieces did not come within the limits of the standard legal weight, so that the number of pieces available for issue was reduced to 56,363,301, the value of these good pieces being, real or nominal, £3,157,966 10s. 1d. Of this amount, £3,070,292 10s. 5d. (41,093,301 pieces) consisted of imperial coinage, the remaining £87,673 19s. 8d. (15,270,000 pieces) being colonial coinage for Canada, Jamaica, Hong Kong, etc. All this coinage, both imperial and colonial, has been executed at the mint, its increased coining power rendering it unnecessary that any portion of the work of coinage should be intrusted to private firms.

The greatest number of coins struck of any

denomination was about 11,700,000, consisting, as will readily be supposed, of pence. Half-pence came next in point of numbers, nearly 7,000,000 of this coin being struck. The number of farthings struck was over 5,700,000, a seemingly large number considering the present small general circulation of this coin. Of shillings, nearly 4,000,000 were coined; sixpences, over 3,400,000; threepences, over 3,300,000. Sovereigns and half-sovereigns were coined to the number of over 1,700,000 and 1,100,000 respectively. Of colonial coinages, that of bronze half-cents for the Straits settlements was numerically largest, 4,000,000 of this coin being struck during the year.

NOTES.

Six-tenths of the gold produced is yielded along with silver.

The iron age is passing away and is being superseded by the age of steel.

Economy, enterprise and free use of capital are indispensable for successful mining.

The excessive import of copper into England and France this year has been almost entirely from America and Japan.

A smoke stack for a smelting works at Pueblo has recently been completed, measuring 10ft. in diameter and 319 ft. high.

Exaggeration misrepresentation of the richness of mineral districts have a tendency to work them permanent injury.

India, which has, heretofore, bought her copper from England, has now a supply at hand in Japan which yields six thousand tons annually.

At Newcastle-upon-Tyne it is announced that the steel plate industry is now fairly well employed, and that there is every prospect of increased work.

The iron product of the United States in 1860 amounted to 900,000 tons of ore; to-day it foots up 8,000,000 tons a year, almost a nine-fold increase.

A new gold-like alloy, valuable in the arts and certain mechanical channels, has been discovered, and is of interest to the copper trade, as its composition contains 66 per cent. of copper.

The Russian Government proposes sending experts to Turkestan to study the turquoise mines on the Persian frontier. The same commission will visit the sulphur deposits recently discovered near Khiva, and the lignite mines and petroleum springs in the district of Ferghana.

AN IMMENSE LODE OF SILVER-BEARING IRON-STONE.—A lode has been discovered at Carowa station, about sixty miles from Silvertown, South Australia. It has been traced for over twelve miles, and in one place is 400 yards broad. A surface assay gives from 2 ounces to 24 ounces of silver a ton.

The exiles who live in the mines in Siberia are exiles of the worst type and political offenders of the best. They never see day-light, but work and sleep all the year round underground, extracting silver or quick-silver under the supervision of task-masters, who have orders not to spare them.

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Notice to Contractors.

SEALED TENDERS addressed to the undersigned, and endorsed "Tenders for Iron Roof Trusses and Girders for Armories, Drill Hall, Montreal," will be received at this office until THURSDAY, the 12th day of November, next, inclusive, for the construction of

Iron Roof Trusses and Girders,

FOR

Armories at the Drill Hall

MONTREAL.

Plans and specifications can be seen at the Department of Public Works, Ottawa, and at the office of A. Raza, Architect, Montreal, on and after THURSDAY, the 22nd instant.

Tenders must be made on the printed forms supplied.

Each tender must be accompanied by an accepted bank cheque, made payable to the order of the Honorable the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party declines to enter into a contract when called upon to do so, or if he fails to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department will not be bound to accept the lowest tender.

By order,

A. GOBEIL.

Secretary.

Department of Public Works,
Ottawa, 14th October, 1885.

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NOTICE.

TENDERS will be received at the Department of Inland Revenue until Monday, 16th November, prox., from parties desirous of leasing the privilege of ferrying across the River Ottawa between Buckingham and the County of Ottawa, in the Province of Quebec, and Cumberland, in the County of Russell, in the Province of Ontario, in accordance with the terms and under the conditions set forth in the regulations, copies of which can be procured from the Inland Revenue Department at Ottawa or postmasters at Buckingham and Cumberland.

Each tender must state the amount which the party tendering is willing to pay per annum for the privilege referred to, which amount will be payable in advance, the terms of the lease being for five years from the 1st May, 1886.

Each tender must be accompanied by a cheque marked "Good" on one of the chartered banks doing business at Ottawa, for one-half the amount of the per annum tender. This amount will be credited on account of the first year's rent in the case of the accepted tender, and all other cheques will be returned, except in the event of withdrawals, in which cases no refunds will be made.

All communications must be addressed to the undersigned and endorsed on the envelope "Tender for the Buckingham and Cumberland Ferry."

WM. HIMSWORTH,
Secretary.

Department of Inland Revenue,
Ottawa, October 26th, 1885.



GRAND COLONIAL

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THE Colonial and Indian Exhibition to be held in London, England, commencing May 1st, 1886, is intended to be on a scale of great magnitude, having for object to mark an epoch in the relations of all the parts of the British Empire with each other.

In order to give becoming significance to the event, a Royal Commission is issued for the holding of this Exhibition, for the first time since 1862; and His Royal Highness the Prince of Wales has been appointed President by Her Majesty.

The very large space of 54,000 square feet has been allotted to the Dominion of Canada by command of the President, His Royal Highness.

This Exhibition is to be purely Colonial and Indian, and no competition from the United Kingdom or from foreign nations will be permitted, the object being to exhibit to the world at large what the Colonies can do.

The grandest opportunity ever offered to Canada is thus afforded to show the distinguished place she occupies, by the progress she has made in Agriculture, in Horticulture, in the Industrial and Fine Arts, in the Manufacturing Industries, in the Newest Improvements in Manufacturing Machinery and Implements, in Public Works by Models and Designs; also in an adequate display of her vast resources in the Fisheries and in Forest and Mineral wealth, and also in Shipping.

All Canadians of all parties and classes are invited to come forward and vie with each other in endeavoring on this great occasion to put Canada in her true place as the premier colony of the British Empire, and to establish her proper position before the world.

Every farmer, every producer, and every manufacturer, has in erect in assisting, it having been already demonstrated that extension of trade always follows such efforts.

By order,

JOHN LOWE,

Sec. of the Dept. of Agriculture.
Ottawa, 1st Sept., 1885.

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CANADIAN MINING REVIEW

VOL. 4.—No. 1.

1886—OTTAWA, JANUARY—1886

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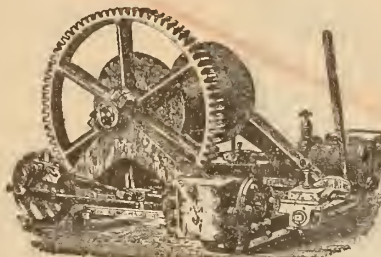
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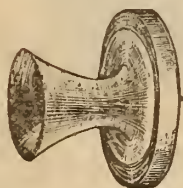
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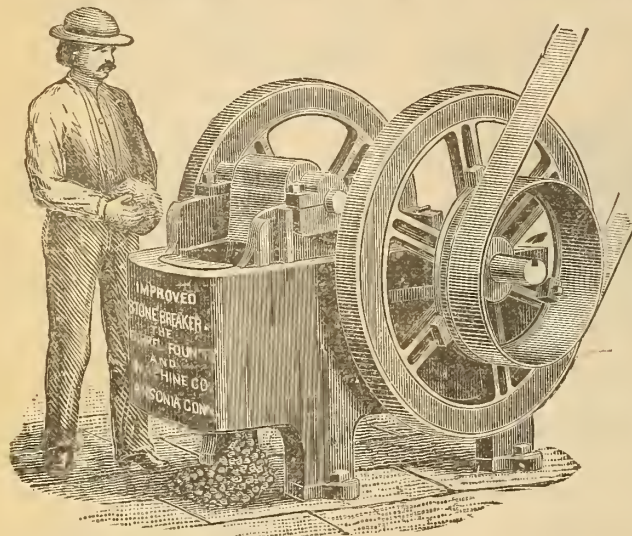
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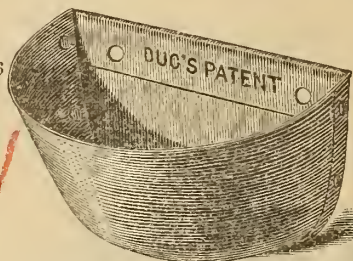
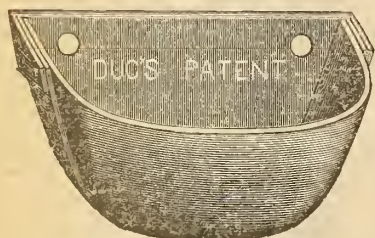
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MINERS WANTED.

50 Good Miners Wanted.

Wages \$1.25 per day; regular board, \$3.00 per week.

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A. H. DeCAMP,
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WANTED.

FIFTY EXPERIENCED MINERS.

Wages, \$1.25 to \$1.35 per day; board, 3.00 per week.

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WANTED.

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Copies on plain paper \$1.00
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ON SALE AT THE

OFFICE OF THE "MINING REVIEW"
OTTAWA

AND THE

GEORGE BISHOP ENGRAVING & PRINTING CO.
169 St. James St., Montreal.



Notice to Contractors.

SEALED TENDERS addressed to the undersigned, and endorsed "Tender for Immigration Buildings, Quebec," will be received at this office on MONDAY, 15th proximo, for the erection and completion of the

IMMIGRATION BUILDINGS,
at the Quebec Breakwater.

Plans and specification can be seen at the Department of Public Works, Ottawa, and at the Dominion Public Works Office, Post Office, Quebec, P.Q., on and after MONDAY, 28th inst.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque, made payable to the order of the Honorable the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party declines to enter into a contract when called upon to do so, or if he fails to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order, A. GOBEIL,

Secretary.

Department of Public Works, }
Ottawa, 19th Dec., 1885. } 2ms

FOR SALE.

DEVELOPED

PHOSPHATE MINE

ADJOINING THE FAMOUS LITTLE RAPIDS MINE IN PORTLAND EAST.

THIS location has been pronounced by experienced practical miners one of the most promising apatite producing properties in the district. There are over TWENTY SURFACE EXPOSURES OF GOOD PROMISE, and one deposit now being worked that proves an extensive body of phosphate at a depth of FIFTY FEET.

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SEALED TENDERS addressed to the undersigned, and endorsed "Tender for Engine House, Toronto, Ont." will be received at this office until MONDAY, 25th instant, for the erection and completion of

AN ENGINE HOUSE,

At the Examining Warehouse,
Toronto, Ont.

Plans and specification can be seen at the Department of Public Works, Ottawa, and at the office of D. B. Dick, Architect, Toronto, on and after WEDNESDAY, 9th instant.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque, made payable to the order of the Honorable the Minister of Public Works equal to five per cent. of the amount of the tender, which will be forfeited if the party declines to enter into a contract when called upon to do so, or if he fails to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order, A. GOBEIL,

Secretary.

Department of Public Works, }
Ottawa, 9th December, 1885. }

Canadian Mining Review.

OTTAWA.

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The CANADIAN MINING REVIEW is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts as well as others interested in Canadian Mineral Lands are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 20th of the month.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

There are, at the present time, substantial indications that capital is seeking investment in mines and mineral lands, and those mines and mining locations that possess real value will be favourably regarded. Unquestionably good properties are in demand, but as capitalists have learned to discriminate, valueless properties need not be presented to them.

The discoveries that have been made during the year just closed indicate, in some degree, the magnitude of the mineral resources of this Dominion. In the provinces of Nova Scotia, New Brunswick, Quebec, Ontario, the North-West Territories, and in British Columbia, important discoveries have been reported and verified, and it is to be hoped that the fortunate discoverers will see how greatly it would benefit themselves and the mining industry of Canada were they to offer reasonable inducements to capitalists to come forward and assist in developing these mineral deposits in order that they may be made productive and profitable.

On another page will be found an interesting summary, by Edwin J. Ball, Ph. D., of the progress made in mining during 1885. Mr. Ball's reputation as a Metallurgist and the position he occupies in the Royal School of Mines, London, England, must render anything from his pen of interest to our readers.

We had hoped to have been in possession, before now, of a complete statement of the asbestos mining industry of the Eastern Townships for the season of 1885, including an account of the operations at the various mines, their total output and the exportation. It has not yet reached us, but will undoubtedly appear in our next issue.

Towards the closing of the past year there were indications of an upward movement in the iron market of the United States. Between the 1st and 7th of December there were enquiries on the Cleveland, O., market for 60,000 tons of pig iron, of which 40,000 tons were Bessemer. Under this active demand prices advanced materially, and are still steadily creeping up.

In the same market, during the year just closed, more iron ore was sold than in any former year in the history of the trade.

The Colonial and Indian Exhibition to be held in London, England, commencing on the 1st of May next, will afford Canada a great opportunity to exhibit to the world at large the vastness and variety of her mineral resources. If there is not a creditable display of the product of Canadian mines, the mine owners will be held responsible, as the Minister of Agriculture, through the Geological Survey Department, has extended to them every facility for forwarding exhibits free of charge.

The fact is beginning to dawn upon the minds of men that the production of mineral is the only legitimate object and purpose of mines or mining operations, and that a sale is not the chief thing to be considered in locating and developing a mining claim. Men also realize that there is a vast difference in the comparative values of a mine and a claim. Capitalists discovered this fact some time ago, and when miners and owners have the same convictions the march of improvement and prosperity will begin.—*Mining Review, Chicago.*

The Metallurgical Association, Limited, is the title of a new company, registered in London, with the large capital of £300,000, in £1 shares, to acquire and work patents. Here is the long-desired "opening" for all metallurgical cranks. The notice speaks of £300,000 as a "large capital;" but it should have been at least £300,000,000; for even that would be a small sum, compared with the inventors' valuation of a few of the grand metallurgical inventions brought to our personal notice, and which have been held back, waiting for just this opportunity to "revolutionize science." We would recommend that the capital be at once increased to at least the figure we have mentioned, and that rules be adopted to secure the equitable and safe division of the dividends, and, in the interest of the strictest economy and safety, that no inventor shall be paid in cash more than ninety per cent. of his own estimate of the value of his invention. The company should have an expert board of managers, composed exclusively of inventors upon whom unappreciative, cold, and heartless scientists have frowned.—*Eng. and Min. Journal, N.Y.*

THE PHOSPHATE TRADE.

The last shipments of phosphate for the season, from Montreal, were made by Messrs. Wilson & Green and Lomer, Rohr & Co. on the 11th November, in S.S. Grassbrooke, to London, amounting to 629 tons, 419 and 210 tons respectively. We give below a statement of all the shipments from the opening to the close of navigation, from which it will be seen they have aggregated 23,908 tons, an increase of 1,765 tons over shipments for 1884. There has been a falling off in the amount forwarded from the Perth and Kingston districts, while the output of the Ottawa County mines has increased 2,055 tons. The prices realized for the year's production have been satisfactory to miners, some of whom have already made contracts for delivery next year at the current prices of the past season, which would indicate that they have been satisfied with the margin of profits these prices have afforded them. The increase in the annual production has not been as great during the past four years as there has been reason to expect, but there has been a steady increase, nevertheless, and it is not unlikely that it will be at a much larger ratio for the season of 1886. The production for the past five years has been as follows:—

1881.....	15,601 tons.
1882.....	17,181 "
1883.....	17,840 "
1884.....	22,143 "
1885.....	23,908 "

showing but a small increase for 1885 over 1884; but it may be said that the output for the season just closed, aggregating close upon 24,000 tons, has been of a higher standard than has ever before been forwarded from the phosphate mines of Canada, the analyses showing it to have analyzed over 80 per cent. Certain shipments from no less than four of the heavy producing mines have assayed upwards of 85 per cent. tribasic phosphate of lime, and we doubt if such results have been obtained at any other phosphate mines in the world.

The American Consul at Ottawa, Mr. T. W. Hotchkiss, in a recent report on the phosphate industry of Ottawa County, addressed to the State Department at Washington, says of Canadian phosphate: "When it was first introduced in the market it was looked upon with suspicion, through a want of actual and reliable knowledge of its value as a fertilizer; but today this state of things is entirely reversed, every pound of the output being contracted for by foreign buyers in advance of production. Being a more concentrated phosphate than is known to exist in any other part of the world, the product of Canadian mines is sought after to bring up fertilizers to a high percentage of phosphoric acid. Regarding the value of this apatite as a fertilizer, a reliable authority states that Canadian apatite contains 91.91 per cent. of tribasic phosphate of lime, according to the most scientific analysis. A comparative table of the composition of certain fluorapatites shows that, with the exception of three limited deposits in the West Indies and one in Spain,

CANADIAN APATITE RANKS HIGHEST.

It may now be said that from no other phosphate mines in the world have shipments been made of so high a standard as have been forwarded from Canadian mines during the past season."

The American Consul refers to recent foreign reports as showing that in those portions of Europe where sugar beet is extensively cultivated—France, Belgium and Denmark—no fertilizer has been found to equal the mineral

phosphate of Canada. In the figures and facts which he quotes in connection with the business in the past, we have observed several inaccuracies; but they are in the main correct—sufficiently so, at least, to serve as data for his report on our phosphate trade, which he recognizes as one of the most important industries of his consulate district. After referring to the various apatite mines worked in Ottawa County, Mr. Hotchkiss points out that the necessity for the use of proper fertilizers is limitless, and must remain so, assuring a demand not spasmodic, but steady, and constantly growing.

PHOSPHATE SHIPMENTS FOR 1885.

THE TOTAL QUANTITY OF CANADIAN PHOSPHATE SHIPPED FROM MONTREAL TO FOREIGN PORTS DURING THE SEASON OF NAVIGATION OF 1885, IS AS FOLLOWS:

Date.	Vessel.	Destinat'n.	Shippers or Agents.	Tons.
May 22	S.S. Sarnia	Liverpool	Lomer, Rohr & Co	178
" 23	S.S. Kehweider	Hamburg	" "	700
" 26	S.S. Oxenholme	Liverpool	" "	101
" 26	"	"	Wilson & Green	485
June 1	S.S. Somerset	Bristol	" "	142
" 3	S.S. Suffolk	London	" "	148
" 3	S.S. Erl King	"	Lomer, Rohr & Co	295
" 4	S.S. Landerdale	Barrow	Millar & Co	160
" 5	S.S. Glenmoran	London	Lomer, Rohr & Co	85
" 9	S.S. Milanese	Liverpool	" "	118
" 9	"	"	Irwin, Hop'r & Co	265
" 10	S.S. Cranos	Liverpool	Lomer, Rohr & Co	650
" 11	S.S. Wandraham	Hamburg	" "	590
" 11	S.S. Mississippi	London	Wilson & Green	318
" 19	S.S. Dominion	Bristol	Lomer, Rohr & Co	322
" 24	S.S. Finsbury	London	" "	544
" 26	S.S. Quebec	Liverpool	" "	120
" 26	"	"	Wilson & Green	197
July 3	S.S. Ontario	Bristol	Lomer, Rohr & Co	300
" 6	S.S. Benbrack	London	Wilson & Green	363
" 9	S.S. Ocean King	"	Lomer, Rohr & Co	268
" 10	S.S. Elgonshire	"	" "	262
" 9	S.S. Bristol	Bristol	Wilson & Green	498
" 16	Bq. Hafford	Cardiff	Millar & Co	65
" 16	S.S. Carnoua	London	Lomer, Rohr & Co	502
" 17	S.S. Texas	Bristol	" "	115
" 16	S.S. Montreal	Liverpool	" "	250
" 18	S.S. Oxenholme	"	" "	427
" 18	"	"	Millar & Co	270
" 21	S.S. Escalona	London	Lomer, Rohr & Co	155
" 21	S.S. Scotland	"	" "	425
" 21	"	"	Irwin, Hop'r & Co	100
" 23	Bq. Merritt	Sharpness	Wilson & Green	45
" 23	S.S. Mississippi	Liverpool	Lomer, Rohr & Co	135
" 24	S.S. Somerset	Bristol	Wilson & Green	386
" 24	S.S. Storm Qu'n	London	" "	276
" 25	S.S. L. Nepikon	Liverpool	" "	259
" 29	Bq. Johanne	Hull	Lomer, Rohr & Co	40
" 29	S.S. Avlona	London	" "	174
" 29	S.S. Kehweider	Hamburg	" "	548
" 29	"	"	Liever R.L.P. & Co	256
" 30	S.S. Brooklyn	Liverpool	Lomer, Rohr & Co	280
" 30	"	"	W. M. Knowles	91
" 30	"	"	Millar & Co	27
Aug. 1	Bq. Scotia	"	Lomer, Rohr & Co	100
" 1	S.S. Dominion	"	" "	277
" 3	S.S. Erl King	London	" "	180
" 5	S.S. Achille F.	P'th Roads	" "	100
" 7	S.S. Oregon	Liverpool	" "	241
" 8	S.S. L. Winnipeg	"	Wilson & Green	300
" 8	S.S. Quebec	"	Lomer, Rohr & Co	184
" 13	S.S. Dracona	London	" "	310
" 13	S.S. Sarnia	Liverpool	" "	48
" 1	S.S. L. Champ'n	"	Millar & Co	325
" 20	S.S. Moan King	Liverpool	Lomer, Rohr & Co	210
" 21	S.S. Ocentral	London	" "	200
" 26	S.S. Barcelona	London	" "	282
" 27	Bq. Orquell	Liverpool	R. C. Adams	110
" 31	S.S. Oxenholme	"	Wilson & Green	715
Sept. 1	S.S. Carnoua	London	" "	195
" 1	"	"	Irwin, Hop'r & Co	22
" 1	"	"	Lomer, Rohr & Co	167
" 4	S.S. Escalona	Bristol	" "	273
" 4	S.S. Scotland	London	" "	157
" 5	S.S. Juliet	"	Wilson & Green	118
" 18	S.S. Benhope	Liverpool	Millar & Co	100
" 18	S.S. Mayo	"	Wilson & Green	190
" 24	S.S. Murciano	"	" "	125
" 22	S.S. Benona	Barrow	Millar & Co	190
" 23	S.S. Colina	Glasgow	Lomer, Rohr & Co	275
" 29	S.S. Celtic M'ch	London	" "	499
" 3	S.S. L. Superior	Liverpool	Wilson & Green	233
" 30	"	"	Millar & Co	210
Oct. 1	S.S. Enrique	Liverpool	Lomer, Rohr & Co	115
" 1	"	"	W. M. Knowles	200
" 3	S.S. Bannwall	Hamburg	Lomer, Rohr & Co	780
" 15	S.S. Oregon	Liverpool	" "	250
" 16	S.S. Concordia	Glasgow	Wilson & Green	207
" 17	S.S. Oxenholme	Liverpool	Lomer, Rohr & Co	450
" 17	"	"	Wilson & Green	255
" 19	S.S. Glenarthy	London	Millar & Co	290
" 19	"	"	Lomer, Rohr & Co	183
" 23	S.S. Maharajah	"	" "	347
" 24	"	"	Wilson & Green	273
" 27	S.S. Scotland	"	Lomer, Rohr & Co	40
" 30	S.S. Wandraham	Hamburg	" "	650
" 30	S.S. Montreal	Liverpool	" "	114
Nov. 10	S.S. Avlona	London	" "	225
" 11	S.S. Grasshopper	"	" "	210
" 11	"	"	Wilson & Green	419
" 1	"	"	" "	29,908

RECAPITULATION OF SHIPMENTS.

	Gross Tons.	
To Liverpool	1885	1884
" London	9,563	8,557
" Hamburg	7,683	4,389
" Bristol	3,524	2,976
" Glasgow	2,056	1,824
" Barrow	482	3,083
" Penarth Roads	350	100
" Cardiff	100	65
" Sharpness	65	45
" Hull	45	40
" Dublin	40	210
" Sunderland	210	60
" Bristol Channel	60	50
" United States	50	200
Consumed in Canada	200	700
Total for 1885	23,908	23,143
Increase for 1885	1,765	23,908
Total shipments from mines, 1885	23,908	Tons.
Shipment from Perth and Kingston districts, 1885	1,500	23,908
Shipments from Ottawa County Mines, 1885	22,408	1884
1884	20,553	2,055
Increase	1885	2,055

LITTLE RAPIDS MINE.

Frequent reference has been made in the *Review* to the constant improvements at the various phosphate mines in the du Lièvre district during the past two years, but at none of them are these improvements more striking than at the *Little Rapids* mine, where everything that ingenuity could devise to facilitate the mining of this peculiar ore appears to have been provided. The buildings, which include commodious boarding-houses, store-houses, supply store, stables and manager's dwelling and office, are complete in every particular and have been substantially constructed with a view to permanency. At the mine nothing is done by hand where it has been possible to introduce steam power. Wherever steam-drills can be used to advantage, there they are at work; steam-pumps, steam-hoists and steam-derricks are employed at the various shafts and open pits, and the condition of the engines, boilers and other machinery gives evidence of careful attention. Other improvements at this mine are worthy of mention, such as, the arrangement of the tramway, which has been so located as to connect all the shafts and pits with a new and commodious cobbing-house, and the substantial and suitable ore-cars. The cobbing-house is well lighted and is heated by steam, and in connection with it an ingenious system of cleaning up the fine phosphate, or separating it from foreign matter, has been introduced. The system itself, which is merely sieving, has always been known in connection with phosphate mining, but at all the other mines it is done by hand, while at the *Little Rapids* the sieves are run by steam and the saving in time and labour, as well as the effectiveness of the work accomplished, is very noticeable. At the cobbing-house are the ore-bins and platforms, arranged to receive the different grades of dressed ore, and thence a tramway leading to the waggon road at base of hill where the phosphate is delivered, loaded into waggons and hauled to point of shipment on the bank of the du Lièvre river. We understand it is in contemplation to extend the tramway to the river, a distance of about half a mile, and with this additional improvement the *Little Rapids* will be equipped in a manner conducive to the raising, dressing and handling of phosphate at a minimum of cost. It is now one of the most attractive mines in the entire phosphate district, not more for the completeness of the equipment than on account of the depth of the shafts and the large bodies of ore in sight in all the workings. The present condition of the *Little Rapids* mine reflects great credit on the

Manager, Mr. George R. Smith, under whose direct supervision all the work above referred to has been done, and who has planned all the improvements and personally superintended the erection and arrangement of the machinery and everything connected therewith.

The Anglo-Canadian Asbestos Company (Limited).

This company has been formed in England and has acquired the asbestos properties at Black Lake, known as the Eureka and Emilie Mines, situated about two miles from the line of the Quebec Central Railway. The capital stock of the company is £50,000 in 25,000 shares of £2 each. The purchase money is £35,000, of which £15,000 is taken in shares, and the vendors, Messrs. Irwin, Hopper & Co., of Montreal, it is said, have expressed a willingness to extend the amount paid in shares to £30,000, at the option of the directors. The company is now putting in machinery at the mines, with the intention of proceeding with mining operations on an extensive scale during the winter. This will be a new departure, as it has been the custom heretofore, to suspend work at all Canadian asbestos mines for the winter months, and the past season was not an exception in this respect, as mining operations were closed down about the end of November. The Anglo-Canadian Company has, however, made contracts for future delivery, which necessitates continuous working at the mine in order that the quantity contracted for may not fall short.

Notes on the Progress of Mining in Europe

BY E. J. BALL, PH.D.,

(Assistant in Metallurgy at the Normal School of Science and Royal School of Mines, London.)

[Written specially for the Canadian Mining Review.]

Among the improvements introduced into Prussian mines in 1885, an account of which has only recently been published, the Haase method of sinking shafts in quicksand seems likely to prove of some importance. It consists in putting down a number of bore-holes communicating with one another around the position chosen for the shaft, and then piping them well, thus forming a protection for the shaft impervious to the sand. Various explosives were tried, and comparative experiments between dynamite and explosive gelatine ended in favour of the latter. Compressed powder was found to be more serviceable in mines than the ordinary variety, and the trials with kinetite gave favourable results.

Various other explosives have been brought into notice during the past year, and they have been tried with more or less satisfactory results; it is claimed for one of them, romite, that it will only explode in enclosed spaces, such as bore-holes; that it does not freeze; and that it can be employed at any temperature. It is a solid, and is said to have a high explosive power.

Messrs. Wickersheimer and Peck propose to enlarge the lower part of a drill-hole by drilling two holes side by side, giving one of them a light charge, and then tamping and firing it in the usual way, the other remaining open. The wall between the lower parts of the holes is blown away, and the holes are cleared by a current of water passed down the empty hole and up the one which has been fired.

Various rock-drills have been reported on, and some exceedingly satisfactory results have been

obtained in German collieries with the Brandt and the Frölich drills.

Experiments which have been made with the lime cartridge appear to show that it is only of importance in the case of fiery pits, where their use gives better results than are obtained by the ordinary mechanical methods.

A very important paper on the "Thick coal of South Staffordshire" has been published by Mr. H. W. Hughes, who gives, for the first time, comparative results, obtained from actual workings, between the three methods employed for mining this seam; square-work, long-wall in one slice; and long-wall in two slices; and he shows that the old square-work system is by far the best, both as regards the percentage of large coal and the freedom from gob fires.

The influence of coal-dust on colliery explosions has been discussed at great length during the past year, chiefly in the Austrian papers, the general opinion being that coal-dust is a very much more important factor in colliery explosions than has hitherto been accepted, and Dr. Hilt in his report on this subject to the Prussian Commission on Fire-Damp gives the results of many hundred experiments which have been made on different varieties of coals. He shows that the character of the explosion is dependent on the nature of the dust, and on the simultaneous presence of gas; and that true coal-dust explosions can explode gas-mixtures, and that, similarly, gas explosions can explode collections of coal-dust. It was further found that while free powder always ignited coal-dust, dynamite shots, and even free-lying dynamite cartridges never set fire to coal-dust alone, and they only did so when upwards of 6 per cent. of gas was present. Wetting the dust was found to be of little use, unless at least one-half its weight of water had been employed.

Numerous safety lamps have been described or tested during 1885, and those employed in the Ostran-Karwin mining district, Austria, have been described at great length by J. Mayer in the *Oesterreichische Zeitschrift für Bergund Hüttenwesen*. Dr. C. Le Neve Foster, in his report on the mining exhibits at the late International Inventions Exhibition, in describing Mr. E. Evans' lamp, states that if it be placed in an explosive atmosphere, the gauze becoming filled with flame, a fine cord is burned through, which, releasing a shield, shuts the lamp entirely off from the surrounding atmosphere, and it goes out before it can lead to an explosion.

Several portable electric lamps have been proposed, but they fail chiefly on account of their weight, and it seems hopeless to look for much improvement in this direction until some very much lighter material is used in secondary batteries than those at present employed.

In several instances the surface works of collieries have been lit by the electric light with considerable success.

Various fire-damp indicators have been brought forward, the simplest being that invented by Mr. Garforth, who uses a flexible india rubber ball, which he fills with the air to be tested, and which is then ejected into the flame of a lamp.

With regard to winding ropes, Dr. Foster states that the locked-wire rope, invented by Mr. Latch, has many advantages over the older forms of wire-rope, especially as regards comparative strength. Several modifications in the methods of winding have also been described.

Wire ropeways have been erected at several mines, more especially in Austria, the one at Raibl having a free span of 700 metres.

The use of electricity as a motive power is gradually coming into use, and a small line has

recently been erected in England in which a number of trucks are moved along a wire ropeway by a current passed through a receiving dynamo attached to the train.

The experiments with the Soda locomotive have been continued in Prussia, but are not yet completed. The Lentz fireless locomotive is based on the one originally designed by Dr. Launm, of New Orleans, and it consists of a boiler provided with an air-jacket and covered with non-conducting materials, which is partially filled with water, into which steam is passed from a generating boiler. The water becomes superheated, and, cooling slowly, gives off steam during a considerable period. The engine is chiefly intended for underground work.

But little of novelty with respect to ore-dressing has appeared, but an important paper on coal-washing plant was read by R. de Soldenhoff before the South Wales Institute of Engineers.

Wire rope has been successfully employed in Sweden in the place of ordinary pump rods; and with regard to deep boring, the bore-hole at Schladebach in Germany is said to be the deepest in existence, having reached, on Sept. 26th a depth of over 1656 metres, the temperature at the bottom being 44° C.

THE HURONIAN MINE.

The opinions of mining experts and men of experience in mining and milling ores are always sought after by mine owners, and those owners who wish to succeed in mining ventures should permit themselves to be guided by the men who have made a life-long study of a business which they are engaging in, perhaps, for the first time. In the case of the Huronian mine, in the gold region west of Port Arthur, Lake Superior district, the company has had the benefit of an opinion, as to the value of its property, from Mr. Charles F. Eschweiler, M. E., of Milwaukee, who was employed as Superintendent of the mine during last summer. Mr. Eschweiler expresses himself in the highest terms as to the richness of the mine, and before retiring from the superintendency he volunteered sound, practical advice to the company for its guidance in the future working of the mine. His opinions and advice have been endorsed by Mr. Richard Crow, of Colorado, who had charge of the company's mill, under Mr. Eschweiler, and who also retired after he had succeeded in putting the mill in proper working order. Mr. Crow's opinions are very plainly and forcibly expressed in the following letter addressed by him to the company's manager:—

Thos. A. Keefer, Esq., Manager of the Huronian Mining Company, Port Arthur, Ont.

DEAR SIR,—Before leaving for my home in the West, I wish to convey to you the very high opinion I have of the Huronian Mine.

In the Western States such a mine would be considered one of great value. It has a vein which, when once properly opened up, can be made to supply a large sized mill. The longer the mine is worked the greater will be the profit derived from it.

The results of your recent mill tests show it to be a mine capable of being made a very large dividend paying concern. Those results can be improved on by abandoning the free milling process and increasing the lift of the present stamps, so that each of your batteries of five stamps will crush about two tons more per day, making the crushed product from each battery about ten tons per day. This would be an important item in working a large mill.

By putting up a new mill with stamps with double issue, and three or four vanners to each battery of five stamps, you could reckon on two batteries of five stamps doing at least as much as three batteries with a single issue.

The Huronian mine vein is very heavily mineralized, much more so than the majority of gold bearing veins. There is a splendid and most convenient site for a new mill close to where your main shaft would be. The water conveniences are admirable and your wood supply abundant. After an experience of over twenty years in the mines and mills of Colorado and the western States, including several months at the Ropes' Gold Mine on the south shore of Lake Superior, I have no hesitation in saying the Huronian mine will compare favorably with some of the best of them, and that it is a most valuable property.

Yours truly,

RICHARD CROW.

SILVER MOUNTAIN.

THE WEST END MINE.

Early in December a shipment of ten tons of ore was made from the west end of Silver Mountain, which created quite a flutter of excitement among the mining fraternity of the town of Port Arthur, who await, with unabated interest, the verdict as to the value of this first shipment from the location.

During last summer a short tunnel had been driven which tapped the vein about twenty feet below the surface outcrop, and from the point of intersection a shaft was sunk to a depth of twenty-three feet. When this work had been accomplished, some intending purchasers visited the property and proceeded to take out a quantity of ore to be submitted to a mill test. The shaft was carried down for some distance, and between the 25th of October and the 21st of November, with but five miners employed, the requisite quantity of ore was obtained. It would be difficult to estimate the value of the ore shipped, even approximately, though it has been stated by some who may be considered fair judges, that it will yield from \$300 to \$500 per ton, in which case it will be a most satisfactory result of less than a month's labor of five men. In addition to the ore shipped, a quantity was raised of a lower grade, which, owing to the cost of transportation, can be made valuable only if treated at or near the mine.

The shaft at the *West End* mine is down thirty-two feet below the tunnel, or fifty-seven feet below the surface outcrop. From the surface to the bottom of the shaft the vein carries good pay ore, but it is unquestionably richest at the lowest point yet reached. The result of the mill test of the shipment of ore above referred to will settle the question of a sale of the property, for or against.

M. J. T.

EAST END MINE.

The following extract from a letter received by a gentleman of Port Arthur from an expert who visited the east end of Silver Mountain shortly after the Cleveland company stopped work, gives an interesting account of the work done. He says: "I looked over the Cleveland company's work to-day, and find that it has all been devoted to the rich little vein, except the shaft on the top of the hill. The upper tunnel starts from a few feet north of the main vein, and runs from it towards the little one for about seventy feet, and then angles towards it for some thirty-two feet. In a few days they

would have cut through to the main vein and seen what it was like, had not the work been stopped. It is a great pity so much time and money should have been wasted in the tunnel and the main vein left totally untested, except at the top, where the chances of getting good ore were so much less. If the company had secured a survey and plan of only about 1,000 feet in the vicinity of their work, as well as of the work done, a glance would have shown how far astray they were, so far as giving the main lode any trial was concerned.—*Port Arthur Sentinel.*

LAKE OF THE WOODS Gold Mining District.

Among the mining districts of Canada none has, perhaps, attracted so much public attention and produced so little tangible result in the shape of successful and flourishing mining concerns as that of the Lake of the Woods. It is some half dozen years or more now since the pioneer prospector, Frank Moore, brought in the first gold-bearing quartz, and from that time on Rat Portage has been enjoying a quiet little "boom" of its own. Its prospects as the centre of a mining district, together with the saw mills that then began to cluster around it, and the advent of the railway, have built it up from a mere Hudson's Bay Company's outpost to a thriving town of no mean pretensions and hopes. There has been the usual influx of gold-hunters, both speculators and prospectors; the usual egress of the disappointed and disgusted, carrying off with them very valuable experience, doubtless, but leaving their money behind them; and the usual percentage of pilgrims to these rocky, rough-pathed shrines of Mammon who have pinned their faith on the place, and having taken up as many claims as they could conveniently persuade surveyors to take shares in payment for the surveying thereof, have settled down as the "ragged millionaires" of the town, waiting with impatience for the propitious turn of fortune's wheel that will enable them to "realize." With all this coming and going and prospecting, the town of Rat Portage has thriven, and bids fair, by an intelligent development of her natural resources, to make for us some day a busy, vigorous city at the western gates of Algoma. Every chain almost of the lake shore and its thousands of islands has been explored in the search for auriferous veins. Hundreds of locations have been taken up in some fashion or another, and half as many have been surveyed and officially applied for; many *bona fide* mines have been started, and many thousands of dollars have been sunk in genuine enterprise; and yet there has been no assuredly successful mine established. Failure or suspension of work *sine die* has been the rule, with one or two exceptions. Expensive machinery has been brought in and expensive buildings have been erected on some locations, only to be pulled down and carried off, or left to take care of themselves, two or three years later. Why is this? There certainly is gold in the country, and some leads carry such percentages of it as, any expert would declare, should authorize mining operations. The men who know the country have confidence in even its immediate future, in spite of these failures. The hard real fact that quartz showing free gold is being constantly brought from different parts of the lake, and that repeated assays have demonstrated that it

is in such quantity as will pay to mine, and the knowledge that similar grade ores are mined successfully in other countries is more than enough to sustain the faith of the believers in the mineral resources of the Lake of the Woods region, in spite of individual failures. If we examine for a moment the cause of these failures and the causes of the general lameness that has characterized mining enterprise in this region hitherto, we shall see that there is no real cause for alarm as regards its prospects as a mineral producing country. First we find that most of the mining schemes set on foot in the Lake of the Woods district were closely associated with the famous land boom in Winnipeg some few years ago, when every chance speculation that offered was eagerly snatched at. Companies were then formed to mine gold on the Lake of the Woods, but before they were well started the boom flattened out, money became scarce, and the mines, after dragging on a half-hearted life for a few months, and getting deeper into debt than into their lead, gradually ceased to evince any signs of life. But not only was this display of enterprise nipped in the bud by the frost of poverty of funds, but had all the money necessary been forthcoming it would in some cases have been expended in mining leads that a little knowledge of mining engineering and a little scientific examination would have shown could have yielded no adequate returns for the expenditure. Enterprise of this kind, misdirected or weakly sustained, is a questionable boon to a mining district, and the failure it brings to itself brings with it discouragement to others. In many of our new mining fields in Canada, ignorance of the principles of mining, and bad management in the initial outlay, is the fruitful source of failure, and the Lake of the Woods is no exception. The advice of trained mining engineers is sadly wanting in most mining concerns, and the importance of the profession is not recognized as it must be if we are to become the great mineral producing country we now give promise of. Another unfortunate obstacle in the way of the progress of the Lake of the Woods district has been the delay in patenting claims, necessitated by the uncertainty of jurisdiction pending the boundary award. The refusal of both Dominion and provincial authorities to grant patents for mining locations has certainly deterred several capitalists from investing their money, although assured of the success of the venture by personal examination and prospecting of the location offered for sale. This is especially true of Americans, who view with distrust any suspicion of uncertainty as to their patents. The settlement of this vexed question and the issue of patents will probably be the signal for the influx of a moderate amount of American capital, which, if expended in a business-like way, will be of the greatest service in developing the region. Gold there is; but to win it from the rocks it is essential to be able to command both money and engineering skill. The gold, though in fairly paying quantities, is rather finely disseminated, and its treatment requires careful and economical management to secure good profits, since there is not likely to be any bonanza that will render good or bad management a matter of indifference.

The Bank of England by law is obliged to purchase all gold bullion offered to it of standard fineness at 77 shillings and 9 pence per ounce, which bullion it can have coined at the mints at the rate of 77 shillings and 10½ pence per ounce.

KINGSTON RED GRANITE.

The question having incidentally arisen as to the relative durability of so-called syenite and granite under conditions of exposure and abrasion, it was thought desirable to obtain scientific opinion. The question was accordingly submitted to Mr. Willmott, a well-known scientist in high official position. The written opinion of that gentleman is contained in the following letter addressed to the president of the Canadian Granite Company:—

A. MACLEAN, Esq.,

President Canadian Granite Co., Ottawa.

DEAR SIR,—Yours of the 30th at hand, asking my opinion of the relative value of the so called Syenite now being used by the corporation of Ottawa for road macadam, and the "Canadian Granite Co.'s" granite from Kingston.

The rock called syenite is probably a hornblende gneiss (the latter mineral greatly predominating), together with a small quantity of felspar, and variable proportions of quartz. The whole impregnated more or less with iron pyrites.

The granite, which is of a medium grained texture, is composed of a dark salmon red cleavable felspar, without any apparent visible signs of decomposition. This material is cemented with a bluish white opalescent quartz in just sufficient quantity to give binding properties to the felspar, the two minerals assuming great uniformity. There are two accessory minerals, hornblende and mica—the former occurring in greenish black specks, and the latter much more sparingly in disseminated scales. In texture it is much finer grained than the Bay of Fundy, and of a more decided color.

The granite is harder than the syenite, but not so tough; this superiority of the latter, however, is sadly marred by the presence of distributed pyrites, which in some cases mark the lines of stratification. This mineral decomposes very rapidly, leaving small empty cells, and thereby increasing the absorptive power of the rock. So, altogether, taking the inferior hardness of the syenite and its likelihood of early disintegration, I cannot but think the granite altogether better calculated for road material.

We may imagine two pieces of the same size, one the syenite, the other granite. When first laid down the syenite is probably the toughest, but after the lapse of a very short time it would be found that the granite would resist a much greater strain than the syenite, through reasons before mentioned. And again, leaving the decomposing agent (pyrites) out of the question, the syenite, on account of its inferior hardness, would be reduced to its minimum in much less time than the granite.

I am, dear sir,

Yours respectfully,

CHAS. W. WILLMOTT.

Iron Mining in Ontario.

The only iron mine that has been continuously worked during the past year in the Province of Ontario, is the *Coe Hill* mine in the County of Hastings, but, on account of the low price of iron, there has been a limited shipment of ore. Up to the 6th July, when the company ceased forwarding from the mine, about 10,000 tons had been shipped and since that date upwards of 20,000 tons have accumulated in the ore heap and await shipment when the market will have improved. This mine is operated by the Ontario Central Railway Com-

pany, and the ore is shipped to Cleveland. It is one of the most promising iron mines in Canada and is rapidly developing into a heavy producer. The vein varies in width from 12 ft. to 40 ft., and has an average of quite 20 ft., as has been proved by three shafts sunk on the vein to the depths of 95 ft., 100 ft., and 130 ft. respectively.

In Tudor Township, County Hastings, work was started at the *St. Charles* mine in October, the object being merely to prove the vein and forward a shipment of ore, before the close of navigation, to be tested. The vein appears to have a width of about 30 ft., and on it a test shaft has been sunk 25 ft. in depth disclosing a fine body of magnetic ore. This mine is situated within a mile of the track of the Ontario Central Railway, and a spur has been put in which connects it directly with the main line.

CORRESPONDENCE.

MINING NEWS.

Editor of the Canadian Mining Review:

SIR,—I have been a constant reader of your paper from its commencement, and I wish to congratulate you on the steady progress which has been made by THE MINING REVIEW, until it is now recognized as a well established medium of great value to the mineral interest in the Dominion. There is one point, however, to which I would like to call the attention of your numerous readers, namely, the importance of their sending you mining news and reports of the discovery of minerals. It has often been a matter of surprise to me how you are able to obtain the large amount of news of this sort which THE REVIEW already contains. Your efforts to supply a good mining paper deserve to be more generally seconded by all mining men, and in fact by everyone interested in any way in the development of the mineral resources of our common country. Hereafter I shall send you any items of information of this kind which come in my way, and if other miners in all parts of the Dominion would do the same we could make THE REVIEW more valuable to each other, and create a more general interest in a real live mining paper. It is impossible for the editor of a journal devoted to a special subject, no matter how gifted he may be, to know everything which may be going on over the length and breadth of half a continent. I am sure that all miners and mine owners in the country wish you success in an enterprise so well calculated to benefit themselves, but the trouble is that there are not enough of them who have been willing, heretofore, to sit down and write you from time to time what they know would be of interest to your readers, and which they would be quite willing to tell if asked verbally. The information I refer to might often be the means of leading to a sale and the development of valuable properties, which would otherwise never be heard of by those desirous of investing in them. Although most of us are more accustomed to handle the pick than the pen, still I have no doubt, Mr. Editor, that you would value even rough or hurried notes on new discoveries, or on the condition or progress of any mine or mineral property that may be working, and that you would put such notes into shape for the press, or see that the printers' proofs were carefully revised. I trust, therefore, that many other miners will join in helping along THE REVIEW in the way I have indicated.

OLD MINER.

[Since the first number of THE REVIEW was issued, our experience has been such as to lead

us to endorse the sentiments expressed by our correspondent, and we feel ourselves indebted to him for his practical suggestions. Canadian mining news and reports of new discoveries of mineral deposits cannot reach those interested in such matters through a better or a more direct channel than by appearing in the columns of this journal. It is always available for the publication of reliable information, and it would be gratifying to us if our readers will be guided by the hints thrown out by "Old Miner" and use THE REVIEW more generally for distributing news and reports affecting the mineral resources of the Dominion.—ED.]

Canada Consolidated Gold Mine.

This property has been worked for some years but, as yet, unsuccessfully, and from the reports which have reached us from time to time we are forced to believe that the cause for this is not due to poor ore or to the size of the veins that have been opened, and must be looked for in the management or in the manner in which the ore has been treated. The mine is situated in the Township of Marmora, Hastings County, Ontario, and within a short distance of the village of Deloro. Three shafts have been sunk on a vein, varying in width from 5 to 15 ft. and averaging about 7 ft., and some drifting and stoping has been done on the vein. The deepest of these shafts is now at a depth of 135 ft. and drifting and stoping has been done at the 60 ft. level. Another shaft known as the *Tuttle*, is down 60 ft. on the vein, from which level they have been drifting and stoping with a view to meet the 60 ft. level of the deep shaft, and from this portion of the vein the richest ore has been obtained. The workings from these two shafts are now about 180 ft. apart, and between them (the *Tuttle* and deep shaft) another shaft is being sunk to catch the common 60 ft. level, but we are not informed for what purpose this third shaft is being put down. The ore of this vein is a mispickel, rich in arsenic and carrying about \$15 in gold, per ton. If there is no fault to be attached to the management at this mine, and if the ore is properly treated, it is difficult to find a tangible reason why a vein averaging nearly seven feet in width and carrying quite \$15 to the ton in gold, as well as a large quantity of arsenic, cannot be worked at a handsome profit. These are the conditions at the Canada Consolidated Gold Mine in Hastings County; a seven feet vein yielding \$15 per ton in gold and rich in arsenic, and yet it has been, up to the present time, a losing enterprise. We will be pleased to any one who will account to us for this state of things.

MANUFACTURE OF IRON IN CANADA.

At the meeting of the American Institute of Mining Engineers at Halifax, in September last, a paper was read by Mr. J. H. Bartlett, of Montreal, giving a complete resumé of the attempts which have been made to manufacture iron in the various provinces of the Dominion since the year 1737 to the present time. Mr. Bartlett has compiled his paper from reports of recognized authorities on the subject, who have, from time to time, been employed to investigate the iron industries, and from facts obtained from the records of the various organizations which have been engaged in the manufacture of iron in Canada during the past century and a-half. Mr. Bartlett's paper presents the facts as he has found them, after much

research, to exist, and, without offering any comment, leaves us to draw our own conclusions. The information that he has put into our hands is such as to lead an enquiring mind to look for the cause of the repeated failures he has thus placed on record, and he leaves us to find out for ourselves why, in almost every instance, disappointment should have attended the efforts of our iron manufacturers rather than a realization of the success promised them by promoters. It is evident that Mr. Bartlett's intention has been to open up a broad field for discussion, and for our own part we congratulate him on his success in so doing. In almost all instances in Canada, of which we are informed, where attempts have been made to manufacture iron profitably, and have proved abortive, the cause of failure can be traced to bad management, ignorance, and systematic disregard of economy, together with too limited capital, and, in many instances, unlimited capital could not have overcome the disastrous effect of the shortcomings of promoters and managers—perhaps mismanagers might be more appropriate. Mr. Bartlett's paper has disclosed unpleasant and uncontrovertible facts, and in the absence of an intelligent explanation of their existence the industry of iron manufacturing in Canada will not, henceforth, hold out much inducement for the investment of capital. It now behoves those who are interested in the development of our iron ore deposits to account for the cause of failure in the past, and to point out a place whereby iron can be successfully and profitably produced.

It will be impossible for us to publish Mr. Bartlett's paper *in extenso*, and we, therefore, content ourselves with printing the following review of it which has appeared in the *Cleveland, Ohio, Iron Trade Review*:—

"The history of iron manufacture in Canada appears to have been written in failures. Reading with much interest the 35 pages of a paper read before the recent Halifax meeting of the American Institute of Mining Engineers, by James Herbert Bartlett, of Montreal, on 'The Manufacture of Iron in Canada' we have been struck with the almost uniform disaster which has attended the efforts of enterprising capitalists to utilize the mineral resources of the Dominion. The discovery of iron ore in the St. Maurice district of the Province of Quebec dates back to 1667, when the West Indian Company had a practical monopoly of all mines and minerals in that vast region. It was not until 1737, however, that, after numerous vicissitudes, any practical effort was made to utilize the mineral wealth displayed. In that year 'La Compagnie des Forges,' being duly chartered by Louis XV., of France, erected a blast furnace. Want of capital, however, caused a suspension of the works, and the Crown took possession of and operated them. The iron was sold at the rate of from 25 to 30 castors (beaver skins) per hundred-weight. Quantities of it were also exported to France. The works finally passed into the hands of private parties by lease, and by 1810 the manufacture of iron was the most important industry in Canada, there existing then a considerable export of cast-iron articles, particularly of stoves. From one set of men to another the works descended until they passed into the hands of the present owner, Mr. George McDougall, of Three Rivers, the furnace having been in blast till the summer of 1883, when, owing to the ore and fuel becoming exhausted, it was finally closed. When working it was the oldest active blast furnace on the American Continent. Toward the last its business had steadily fallen off until there was no profit in it.

We have cited this particular instance, first, because it was the pioneer iron-making enter-

prise of Canada, and secondly, because it is but a type of nearly all the concerns which have followed it. The Radnor forges, at Fermont, established in 1860, sunk over a million dollars through bad management and were finally destroyed by fire. L'Islet Blast Furnace, near St. Maurice, has not been in operation for years. The Canada Iron Mining and Manufacturing Company's blast furnace, at Hull, was started in 1857 and soon after abandoned as a failure, economically. The St. Francis River Mining Company's furnace, in the County of Yamaska, built in 1869, was abandoned in 1880 on account of the exhaustion of the ore supply. The same may be said of the works at Baie St. Paul, Moisie, Quebec, Haycock, and Montreal (abandoned after \$80,000 had been spent in experimenting with crude petroleum as fuel). The only successful works in the Province of Quebec are the Grantham Iron Works, in the County of Drummond, and four concerns in Montreal.

Turning to Ontario, we find the history of her sister Province repeated in nearly every instance. The first attempt to manufacture iron in Ontario was made at Lyndhurst, County of Leeds, in 1800, water being utilized to drive the machinery and work the blast. Only ruins remain to tell the story of the ultimate financial disaster. Normandale Furnace, in the County of Norfolk, built in 1815, made a few tons of iron and then became "bunged up" and sent the disheartened projector to his grave. Subsequently it enjoyed a term of high prosperity but was ultimately abandoned on account of the failure of the supply of raw materials. Another "big hole" into which English, Canadian and American capital was successively "blown" was the Marmora Iron Works, once successful, but now in ruins. The Madoc Blast Furnace, built in 1835, had a short run and finally ran into the ground. So, also, with the Houghton Iron Works, the Furnace Falls Iron Company (1882), the Toronto Rolling Mills and Iron Works (1860-1873), the Steel, Iron and Railway Works Company, of Toronto (1866-1873), Date's Patent Steel Company, Toronto (1873), and the London Steel Works (1883-4)—all tell the same wearisome and disheartening story. The only iron works now running in Ontario are the Hamilton Iron Froging Company and the Hamilton Rolling Mill.

In New Brunswick only one attempt has been made to erect smelting works, namely, at Woodstock in 1835, which, however, were closed down in 1862. Three rolling and forging mills are now running—one at Coldbrook and two at Portland.

In the discovery of iron ore Nova Scotia precedes all other provinces, first mention of the same having been made in 1604. The first attempt to manufacture iron was not made, however, until the beginning of the present century. Passing over several minor projects (which, it seems needless to remark, resulted disastrously), we refer briefly to the celebrated Acadia Iron Works, at Londonderry, only to say that, after a remarkable history of ups and downs for 35 years, during which millions of dollars have been sunk, they are now in liquidation. There are at present in operation fairly successful forge and plate works at Halifax and Trenton.

Subsequent to the publication of the foregoing, Mr. T. D. Ledyard, of Toronto, addressed a letter to the Editor of the *Iron Trade Review*, which has since appeared in the columns of that journal, as follows:—

"I noticed an article in a recent number of the *Review* giving a doleful account of failures of iron works in Canada. It is only too true that many of these enterprises have been unfortunate, generally, however, through bad management. There was great extravagance in connection with the Marmora Iron Works and the iron was teamed about 30

miles to Belleville at great expense. John McDougall, of the Caledonia Iron Works, Montreal, and McDougall Bros., of Three Rivers, in Quebec, have been successful for a number of years in smelting iron, mostly from bog ore. It is difficult to see why a furnace in connection with such an ore property as described in the enclosed report should not be successful. There is plenty of excellent ore, well situated, with fuel and flux close at hand." Yours truly, T. D. LEDYARD.

If our view of the manufacture of iron in Canada was a trifle doleful, our correspondent will have to settle that with the writer of the paper read before the Halifax meeting of the American Institute of Mining Engineers, whose main points were condensed into our article.

The deposit referred to by Mr. Ledyard is in the township of Belmont, Peterborough, Ontario, six miles west of the Central Ontario Railway and within four miles of connection with the Ontario & Quebec Railway. Selected specimens of the ore have analyzed as high as 64.26 per cent. of metallic iron, as low as 0.04 per cent. of sulphur, a faint trace of phosphorus and no titanium. Explorations appear to show that the deposit is of wide extent. The ore is strongly magnetic and of fine grain. Professor Hayes, of Toronto, says of the advantages which this district affords for the smelting of ore:

"The facilities for obtaining hard wood and charcoal from the surrounding country are especially favorable, from the close proximity of Belmont Lake and its tributary waters, including Crow River, which flows through Lots 14 and 15 of the same range, within a mile and a half of the mine. A fine site for erecting a blast furnace is found on Crow River close to the branch railway line, on which there is also powerful and never failing water power. Abundance of limestone for flux is found on these waters."

It is estimated that the ore can be laid down at the furnace for \$1.25 per ton. The Canadian Government gives a bonus of \$1.50 per ton on all iron and steel manufactured in Canada. With such apparently favorable conditions as these, the question would naturally arise, Why has not capital long since taken hold of an enterprise so promising?

We would urge others to take up the subject as Mr. Ledyard has done and to point out the advantages of iron smelting in Canada, in contradistinction to the unhappy experience of the past, as pointed out to us by Mr. Bartlett.—(Ed.)

ORIGIN OF THE NATIVE IRON OF GREENLAND.

Since 1813, pieces of native iron have been brought from Greenland by many explorers, and have, in nearly every case, been ascribed to meteoric origin. Steenstrup, in his third voyage to Greenland (1876-1880), however, found the iron native in a basaltic rock at Asuk, in grains varying from a fraction of a millimeter to eighteen millimeters. It is also found on the western and northern sides of Disko Island, and in other places. This settles beyond a doubt the question of the origin of the Greenland native iron, and the ore may be of great commercial importance in the future.

IMPROVEMENT IN THE BESSEMER PROCESS.

An improvement has been made on the Bessemer steel process at the Edgar Thompson Steel Works which, it is said, will have the effect of making Bessemer steel equal in quality to crucible steel, while it will cost only about one-tenth of the price. The change consists in a thorough mixing of Spiegel iron or manganese with molten iron in a ladle, so as to uniformly carbonize it. Bessemer steel can be produced at a cost of a cent to a cent and a half per pound, while that made in crucibles costs at least eleven cents per pound.

It is in contemplation to erect a large asbestos manufacturing mill at Thetford, Beauce.

MINERAL WOOL.

In the last issue of the *REVIEW* we referred briefly to this material and the various uses to which it can be applied to advantage. It is also known by the name of *silicate cotton*, and is useful for the insulation of heat, as a protection against frost, for a preventive of the spreading of fire, for deadening sound, and as a safeguard against the ravages of rats, mice and insects. *Mineral wool* is the slag of blast furnaces converted into a fibrous state. The process consists in subjecting a small stream of the molten slag to the impelling force of a jet of steam or compressed air, which divides it into innumerable small shot or spherules, forming a spray of spark-like objects. The threads are spun out immediately upon the detachment of the slag particles from the main body of the stream, their length and fineness being dependent upon the fluidity and composition of the material under treatment. When the slag is of the proper consistency, the shot are small at the outset, and are to some extent absorbed into the fibre; but in no case will they entirely disappear, so that it becomes necessary either to separate the two while still in mid air, by strong currents, or else to put the bulk of the product through a riddling machine. The finer and lighter threads are carried away from the shot, and heavier fibres, making a gradual separation between the extreme fine and the coarse. The production is divided into two grades; the *ordinary* includes all the *mineral wool* weighing over fourteen and less than twenty-four pounds, and the *extra* includes what weighs less than fourteen pounds to the cubic foot.

The resemblance of the fibres to those of wool and cotton has given the names by which the material is known, *mineral wool* and *silicate cotton*, but the similarity in looks is as far as the comparison can be followed. The hollow and jointed structure of the organic fibre, which gives it flexibility and capillary properties, is wanting in the mineral fibre. The latter is simply finely spun glass of irregular thickness without elasticity or any such appendages as spicules, which would be necessary for weaving purposes. The rough surfaces and markings of the fibre can only be detected under a strong magnifying glass.

The drawing out of the fibres is a mechanical operation; it is a remarkable illustration of the wide variety mineral substances will assume under different conditions of cooling. Fleecy *mineral wool* is, in reality, identical in composition with the hideous blast furnace slag.

The peculiar reason why *mineral wool* is a non-conductor of heat is owing to the quantity of air it contains. Air is subtle and rapid in its movement, and is so slow to convey heat, except on its own motion, that it becomes a distributor of it, and also a barrier to its transmission, according as it has, or has not, freedom to circulate. If the air-confining material is not very loose and porous it will be found to transmit heat, and the reduction of the percentage of volume of air, by making the material more compact, develops its capacity for conducting heat.

One cubic foot of slag weighs 192 pounds, while the same weight in ordinary *mineral wool* measures eight cubic feet, so that the resulting fibres encase eight times the quantity of air that the slag did; in other words, the cubic foot before conversion contained 100 per cent. of material, and after conversion only 12 per cent., therefore the product must contain 88 per cent. of its volume of air. The *extra* grade has 92 per cent. of its volume of air, and is, conse-

quently, a better non-conductor than the ordinary.

The transmission of sound is prevented by a filling of *mineral wool*, because of its elasticity and want of solidity. It therefore possesses the properties of heat-proofing, fire-proofing and sound-proofing, and is also valuable on account of the irritation which the glass fibres cause to insects and vermin, and the fact of there being nothing in its composition to help to breed or harbor insects.

One objection that has been raised to the use of *mineral wool*, made from furnace slag, is that it will corrode pipes or boilers whenever leaks occur or exterior dampness penetrates it. Water is, of course, the primary cause of the rusting, but it is claimed that the percentage of sulphur contained in the slag becomes dissolved by the water, and in the form of sulphuric acid attacks the surfaces unless they are kept dry by radiated heat. In order to obviate this fault, where it would be objectionable, an article is now being manufactured from non-sulphur bearing rocks which is absolutely free from sulphur and its compounds. It is distinguished by the name of *rock wool*, and though more costly than the *slag wool*, the difference in weight reduces the cost of transportation in favour of the former article.

It is admitted that *silicate cotton* stands at the head of the list as an insulator, 10 inches thick, being equivalent to 12 to 15 inches of wood charcoal; but it is very much more costly, and it is claimed by some that it possesses the fault of being friable and liable to fall into powder, especially if used on board ship, from the incessant motion of the vessel when out at sea. This objection has been controverted from the fact that it is the practice of the Chicago, Milwaukee and St. Paul Railway Company to jacket their locomotive boilers with *extra mineral wool*, and that since 1878 the passenger cars of the Pennsylvania Railway Company have been lined with *ordinary* quality. The vibrations in both cases must be severe, and its adaptability for these purposes has been established.

The Krupp Iron Works at Chemnitz.

The American Consul at Chemnitz, Mr. George C. Tanner, reports, under date of September 1, 1885, the following interesting particulars concerning the Krupp works at that place:

The Krupp Iron Works, which were founded in 1810, employed in 1855, 693 workmen.

The number of workmen in 1882 was 10,598; the number of houses they occupied was 3,208, in which, including families, 16,200 people lived. These houses were built in flats containing from two to five rooms, the rent of which ranged from \$16 to \$50 a year. A boarding house was also established by the managers of the Krupp Works which would accommodate 500 men, where dinner with meat four times a week, coffee, butter, and everything is provided but bread. A co-operative store exists and has proven very beneficial to the operatives of Mr. Krupp. A sick club has existed since 1856 and in 1882 had 11,011 members and a fund on hand of \$313,490.

The pensions in 1882 amounted to \$10,042, and the death liabilities to \$1,000. There is a sanitary committee at the works. The works have had a fever hospital since 1871 and an infirmary since 1872. A disinfection house and appurtenances have also been instituted on Dittmar's plan. Baths are placed near the entrance of the works for the use of the working people.

In 1876 a life insurance fund was started and is now in a flourishing condition. A high school

with twenty class-rooms, and a private school with sixteen rooms are among this gentleman's beneficent care, and since 1876 five technical schools have been in existence in which, among other instructions, women are taught household work or the art of making home comfortable on a minimum of expenditure. Charities for disabled men, women and invalids generally, have been in operation for more than ten years where those not utterly disabled may prosecute light work, such as brooms, baskets, shoes and other labour of the kind which goes to the co-operative stores. In one week of last year the number of labourers dependent upon and who received the benefits of Mr. Krupp's humane treatment was 65,381.—*E. and M. Journal*, N. Y.

SPRING HILL COLLIERIES, NOVA SCOTIA.

One of the results of the Halifax meeting of the American Institute of Mining Engineers, held in September last, has been to bring prominently before the American people the importance of the mineral resources of Nova Scotia—notably, her coal fields and iron ore deposits. The most important development in the coal fields of the province has been at the Spring Hill collieries, of which the *Engineering and Mining Journal*, in an article on the subject, says—"The Cumberland coal basin, Cumberland County, Nova Scotia, is the most easterly coal field in the province, and it is also one of the most important in area and in thickness of coal. The limits of the Cumberland coal field are not definitely known, but little exploration work having been done; but it is estimated by Mr. Edwin Gilpin, inspector of mines, to cover 300 square miles out of some 685 square miles of known productive coal area in the province.

By far the most important development in the Cumberland field is at the Spring Hill collieries, where extensive mining operations have been carried on during the past ten years by the Cumberland Coal and Iron Company, which owns some 20 square miles in this field. These operations have proved this basin to contain the following seams and intermediate measures:

Coal, North seam worked	13 feet.	
Strata		105 feet
Coal seam	5 "	
Strata		130 "
Coal seam	2 " 4 in.	
Strata		185 "
Coal, Main seam worked	11 "	
Strata		80 "
Coal, South seam, worked	11 "	
Strata		180 "
Coal, opened	8 " 6 in.	
Strata		190 "
Coal	4 "	
Strata		176 "
Coal	2 " 9 in.	
	57 ft. 7 in.	966 ft.

Other workable seams are known to exist below these.

Three of these seams are extensively worked and have produced in the past eight years the following quantity of coal:

1878	100,621 tons.	1882	210,000 tons.
1879	88,405 "	1883	200,000 "
1880	127,297 "	1884	250,000 "
1881	160,485 "	1885 (estimated) ..	300,000 "

The extent of the workings shows clearly both the regularity of the coal-seams and the quality of the coal. With regard to the former, it may be said that the beds are remarkably uniform in thickness and quality, with neither faults nor pinches, and but very little shale in the seams. The inclination of the beds varies from about 38 degrees at the south end of the field (where the measures are cut off abruptly by a fault that cuts across the line of strike), to 14 degrees at the north slope on the south seam,

nearly four miles on the outcrop distant from the fault. The mines are opened by four slopes of various depths up to 1,300 feet, and levels have been driven out for a length of more than two miles.

THE QUALITY OF THE COAL.

The coal is a good steam and coking coal, as the following analyses, made by Mr. Edwin Gilpin, Jr., testify:

	North seam.	Main seam.	South seam.	6-foot seam.
Moisture	1.625	.78	1.39	3.47
Vol. combustible	28.672	31.32	31.22	26.98
Fixed carbon	65.431	62.54	61.58	64.48
Ash	4.272	5.34	5.79	5.07
	100.000	99.98	99.93	100.00
Sulphur	.781	1.38	.80	.23
Theoretical evaporative power	8.099		8.46	8.86

In ordinary shipments in quantity no doubt the amount of ash, and with it the percentage of sulphur, would exceed the figures here given; but it is nevertheless true that this property produces a fuel of excellent quality for general manufacturing purposes, and even unwashed slack yields a fair furnace fuel; while, if the slack were washed and coked in, say, a Simon-Carvès oven, it should produce an excellent coke at a very moderate cost. The great thickness and regularity of the beds, their freedom from slate bands; the soundness of the roof and floor, which neither fall nor creep; the comparative dryness of the mines and their total freedom from fire-damp—which has never been met with, though the mine has a depth of 1,300 feet on the seam—are all conditions which promote economical production, and should, with a large and easily accessible market, make this property not only extremely valuable to its proprietors, but a very important and interesting source of supply for our American consumers, manufacturers and furnace men to consider.

The Spring Hill collieries are connected by 27 miles of railroad—owned by the colliery company—with the fine shipping port of Parrsboro' on the Bay of Fundy. By a proposed extension of about one mile the docks can be placed where there will be open navigation the year through, with the exception of a few weeks in winter. On the other side, these collieries connect with the Intercolonial railroad, and it is proposed to add a short line of railroad to the port of Pugwash, on the waters of the St. Lawrence.

So far as the colonial markets are concerned, the Spring Hill collieries supply the Dominion Government, principally for the Intercolonial railroad; the Richelieu & Ontario Navigation Company; the Grand Trunk railroad; Montreal, and other roads and cities. A small quantity of the slack only comes to the American market, though freights to New York harbor from Parrsboro', it is said, could be made at \$1 to \$1.25 a ton, for large and regular shipments.

American industries have an especial interest in this great coal-field, for it may become a very important source of supply for manufacturing and metallurgical works situated along our Eastern seaboard. Considering the fact that we export to Canada far more coal than we import from all countries, there is a fair probability of reciprocity in coal, at least, being enacted in the interest of our coal and manufacturing industries.

We imported only 64,515 tons of Nova Scotia coal last year; while we exported, almost exclusively to Canada, in the same year, 1,342,018 tons of anthracite and bituminous coal. In Canada our coal pays a duty of 60 cents a ton; while Nova Scotia coal coming into this country pays a duty of 75 cents a ton for all except slack, which pays 30 cents a ton. No doubt the

removal of the duty on both sides would increase our exports far more than our imports of coal and it would afford a cheaper fuel to our metallurgical works situated on the Atlantic coast.

At what price could we then obtain coke in New York harbor? Spring Hill slack could probably be delivered f.o.b. at New York, with a fair profit to the mines, at \$1.75 a ton, and run of mine at perhaps \$2 to \$2.25. And as the by-products of coking in the vicinity of New York could be utilized, and would return a profit on the operation, the cost of coking need not be counted. A good furnace coke could therefore be delivered here at from \$3.50 to \$4 a ton, which is about the present price of furnace coke here, while to work at Boston and farther east the cost would be still less.

Experience has demonstrated that with the present duty no considerable amount of Nova Scotia coal can come in while our superior Cumberland and Clearfield coals are sold at the mines, including miners' profit at 7½ cents a ton and are carried by our railroads at three mills per ton-mile; but the time will come, whether through reciprocity in a few raw materials, or, later on and better yet, by annexation of the New Dominion, when the vast mineral resources of Nova Scotia will be developed by opening to them an enormous market in our Eastern States. Then will the great Spring Hill collieries, which, now in their infancy, have a capacity of from 1,200 to 1,500 tons a day, grow into the realization of the magnificent, though by no means visionary, plans of their very able and enterprising managing director, Mr. R. G. Leckie.

COAL IN CHILI.

The only sources from which fuel can be obtained in all South America are, it is said, the coal mines that lie at the extreme southern limit of the populated district of Chili. Taichuan is the nearest port of importance; but the towns at the mines are Lota and Coronel. The mines are entered by shafts that are immediately over the water of Lota Bay, so that the coal is drawn on trucks to the mouth of the mines, and dumped into launches and lighters, which are towed out to the anchorage of ships. It is said that it costs \$1.35 a ton to mine and deliver this coal on ship-board, and that the owner, Donna Isadora Cousino, of Santiago, who is said to be the Ceresus of South America, will not sell at less than \$7.50 a ton, just a shade less than the cost of imported Cardiff coal.

COST OF PRODUCING CHARCOAL.

In the manufacture of charcoal iron, one of the most important points to be considered is the cost at which charcoal can be produced in the vicinity of the furnaces, and for the benefit of those who may be seeking such information we publish the following extracts from an article on this subject which has appeared in the *Journal of the United States Association of Charcoal Iron-Workers*.

"In the manufacture of charcoal, one of the prominent factors of cost is the value of the wood used, and we have found instances in which parties seem to misunderstand or fail to appreciate the bearing that a few cents per cord, added to the price of cord-wood, has upon the cost of a bushel of charcoal made from it. This want of appreciation we find the more marked where the smaller yields of charcoal are obtained, and where, as a consequence, the proportion of the cost of wood per bushel is greater than where a larger number of bushels of char-

coal is obtained from a cord of wood. For the purpose of showing the importance of attention to this subject, we have prepared the following table, which illustrates the value of using the process or processes of carbonization that gives the largest yield in bushels per cord, particularly where the cost of chopping wood or the value of standing timber is great.

"We have known wood to be cut for 30 cents a cord, and have been informed that in exceptional cases over \$1 a cord has been allowed choppers.

"Where kilns or retorts are used, cord-wood is often purchased, delivered on the railroad or hauled to the plant; and for such delivery some charcoal iron-works pay from \$3 to \$4 a cord. We have, therefore, shown the cost of wood as ranging from \$1 to \$4 a cord for wood purchased, cut, and delivered; the prices advancing from 5 cents up to \$2 a cord, and from that figure advancing by 10 cents to \$4 a cord.

"In coppice growth, or where inefficient colliers are employed, or where the cord of wood purchased is not a full cord, a yield in meilers as low as 20 bushels of charcoal from a cord of wood has been obtained, and where liberal cord measure is obtained, it is claimed that 75 bushels of charcoal a cord can be secured by the judicious operation of retorts, and we have

VALUE OF WOOD IN 100 BUSHELS OF CHARCOAL.

Price of Wood, Stumpage, Chopping, or Delivered at Works.	Yield of Charcoal in Bushels obtained from one Cord of Wood.							
	40	45	50	55	60	65	70	75
Per cord.	\$	\$	\$	\$	\$	\$	\$	\$
\$1.00	2.50	2.22	2.00	1.82	1.67	1.54	1.43	1.33
1.05	2.63	2.33	2.10	1.91	1.75	1.62	1.50	1.40
1.10	2.75	2.44	2.20	2.00	1.83	1.69	1.57	1.47
1.15	2.88	2.56	2.30	2.09	1.92	1.77	1.64	1.53
1.20	3.00	2.67	2.40	2.18	2.00	1.85	1.71	1.60
1.25	3.13	2.78	2.50	2.27	2.08	1.95	1.79	1.67
1.30	3.25	2.89	2.60	2.36	2.17	2.00	1.86	1.73
1.35	3.38	3.00	2.70	2.45	2.25	2.08	1.93	1.80
1.40	3.50	3.11	2.8	2.55	2.33	2.15	2.00	1.87
1.45	3.63	3.22	2.90	2.64	2.42	2.23	2.07	1.93
1.50	3.75	3.33	3.00	2.73	2.50	2.31	2.14	2.00
1.55	3.88	3.44	3.10	2.82	2.58	2.38	2.21	2.07
1.60	4.00	3.56	3.20	2.91	2.67	2.46	2.29	2.13
1.65	4.13	3.67	3.30	3.00	2.75	2.54	2.36	2.20
1.70	4.25	3.78	3.40	3.09	2.83	2.62	2.43	2.27
1.75	4.38	3.89	3.50	3.18	2.92	2.69	2.50	2.33
1.80	4.50	4.00	3.60	3.27	3.00	2.77	2.57	2.40
1.85	4.63	4.11	3.70	3.36	3.08	2.85	2.64	2.47
1.90	4.75	4.22	3.80	3.45	3.17	2.92	2.71	2.53
1.95	4.88	4.33	3.90	3.55	3.25	3.00	2.79	2.59
2.00	5.00	4.44	4.00	3.64	3.33	3.08	2.86	2.67
2.10	5.25	4.67	4.20	3.82	3.50	3.23	3.00	2.80
2.20	5.50	4.89	4.40	4.00	3.67	3.38	3.14	2.93
2.30	5.75	5.11	4.60	4.18	3.83	3.54	3.29	3.07
2.40	6.00	5.33	4.80	4.36	4.00	3.69	3.43	3.20
2.50	6.25	5.56	5.00	4.55	4.17	3.85	3.57	3.33
2.60	6.50	5.78	5.20	4.73	4.33	4.00	3.71	3.47
2.70	6.75	6.00	5.40	4.91	4.50	4.15	3.86	3.60
2.80	7.00	6.22	5.60	5.09	4.67	4.31	4.00	3.73
2.90	7.25	6.44	5.80	5.27	4.83	4.46	4.14	3.87
3.00	7.50	6.67	6.00	5.45	5.00	4.62	4.29	4.00
3.10	7.75	6.89	6.20	5.64	5.17	4.77	4.43	4.13
3.20	8.00	7.11	6.40	5.82	5.33	4.92	4.57	4.27
3.30	8.25	7.33	6.60	6.00	5.50	5.08	4.71	4.40
3.40	8.50	7.56	6.80	6.18	5.67	5.23	4.86	4.53
3.50	8.75	7.78	7.00	6.36	5.83	5.38	5.00	4.67
3.60	9.00	8.00	7.20	6.55	6.00	5.54	5.14	4.80
3.70	9.25	8.22	7.40	6.73	6.17	5.69	5.29	4.93
3.80	9.50	8.44	7.60	6.91	6.33	5.85	5.43	5.07
3.90	9.75	8.67	7.80	7.09	6.50	6.00	5.57	5.20
4.00	10.00	8.89	8.00	7.27	6.67	6.15	5.71	5.33

therefore embraced in the table a yield covering every possibility, and varying from 20 bushels to 80 bushels. The figures advance by fives, and from these and the cost of wood any intermediate amounts can be approximated.

The cost of wood per 100 bushels of charcoal is given to obviate using fractional parts of a cent for single bushels, and it has not been deemed necessary to carry the calculations beyond where the wood would cost less than one tenth of a cent a bushel, nor more than 10 cents a bushel of charcoal."

The table published in the *Journal of the United States Charcoal Association of Iron-Workers* runs from 5 cents to \$4 a cord for wood, and from 20 to 80 bushels yield, but we have only printed those figures which will apply to localities in

Canada where it is at all likely that the manufacture of charcoal iron may be engaged in.

"We have been furnished with a detailed estimate of the actual cost of meiler coaling in a tract of large timber yielding 60 cords an acre in Tennessee, the cost being taken from absolute expenditures.

COST OF MAKING 100 BUSHELS (2258 CUBIC INCHES EACH) OF CHARCOAL.

Making hearth and preparing dust for cover	\$0.220
Hauling wood, leaves, and water to hearth	.750
Drawing charcoal from cover	.375
Setting and covering wood	.375
Tools	.050
Hire of cattle and feed	.085
Wages of boss collier and incidental expenses	.200

Total \$2.055

Or a little over 2 $\frac{1}{10}$ cents a bushel of 2748 cubic inches.

"Coaling sapling wood costs from 2 $\frac{1}{4}$ to 3 $\frac{1}{2}$ cents a bushel.

"To this add cost of cutting and ranking wood, value of wood-leave, and hauling charcoal to works."

Plymouth Consolidated Gold Mine.

The result of the operations at this mine for the nine months ending 30th September, 1885, show that work has been carried on during that period at a profit of nearly two hundred per cent., which is made the more remarkable by the fact that this enormous profit has been realized from ore that did not yield \$13 per ton in gold, average. The monthly production, expenditure and disposition of profits, have been as follows:

QUARTERLY REPORT, OCTOBER 1ST, 1885.

Gold Bullion produced January, 1885	\$85,721 99
February	80,974 87
March	80,135 03
April	82,191 67
May	81,927 39
June	82,656 70
July	82,240 83
August	73,156 97
September	75,644 98
Total product for nine months, 1885	\$724,650 43
Operating Expenses—January, 1885	\$25,761 45
February	26,721 11
March	29,448 34
April	27,152 62
May	24,909 32
June	25,704 61
July	29,686 29
August	29,831 95
September	26,910 17
Total Operating Expenses, nine months, 1885	\$246,105 86

Profit	\$478,544 57
Cash on hand, January 1st, 1885	74,295 06

Amount applicable to dividends	\$552,839 63
Paid nine monthly dividends (Nos. 20 to 28, inclusive) of \$50,000 each	\$450,000 00
Construction Account, nine months	15,853 79
	\$465,853 79

Cash surplus, Oct. 1st, 1885 \$ 86,985 84
The cash on hand, \$86,985.84, is "actual surplus," the Company having no indebtedness whatever.

In his quarterly report the president states that the year has been an unusually dry one. The rainfall of last winter and spring was extremely light, and the season commenced with but little snow in the mountains. A summer of excessive heat followed, causing large loss of water by evaporation. The supply of water for power had thus been curtailed and rendered it necessary for several weeks to run one of the mills on short time. On this account the product for August and September were below the average, and the same cause will have reduced the output for October. By November it was expected the fall rains would have commenced, and it is unlikely that the drawback of the past season will be repeated for many years to come.

Since 1880, when diggings for amber commenced under the Smaland Peninsula in East Prussia, the yield of the veins here has greatly increased. In 1864, the revenue was \$8,500, against \$125,000 in 1883.

South African Diamond Trade.

Returns recently published in Kimberley give the production of Cape diamonds from the four chief mines during the three years ended Aug. 31st last, as follows:—

	Carrats.	Value.
Kimberley.....	2,280,123	£2,211,239
De Beer's.....	1,447,335	1,516,353
De Toit's Pan.....	1,483,184	1,099,666
Bultfontein.....	1,615,878	1,658,070
Total.....	6,826,520	£7,485,338

Dividing the three years into two periods of eighteen months each, it appears that the production of the Kimberley mine fell off one half during the second period, while the other three mines increased their output one-sixth. The exports in each year are as follows:—

	Carrats.	Declared value.
Four mos. ended Dec. 31, 1882.....	796,546	£1,156,273
In 1883, 12 months.....	2,413,954	2,742,521
In 1884, 12 months.....	2,263,636	2,877,288
In 1885, 8 mos. ended Aug. 31.....	1,537,196	1,586,793
Total 36 months.....	7,011,332	£8,292,878

It thus appears the exports of diamonds from the colony (making allowance for exports not included in the returns) can not have been worth less than £9,000,000 for the three years, or an average of £3,000,000 a year. Were this sum struck out from the total export trade, the balance against the colony would obviously be very serious. The importance of suppressing the trade in diamonds stolen from the mines, to which the Cape Government has latterly given increased attention, is thus apparent.

MINING NOTES.

NOVA SCOTIA.

A bar of gold was taken to Halifax on December 1st from the Archibald & Mott mine, at Salmon River. It weighed 900 ounces and was valued at \$17,000.

The gold mining property near Oxford is now under the management of S. J. Keyes & Co., and report says it is likely to prove as rich as the well known Oxford mine.

It is reported that a party engaged in prospecting in Lunenburg county has discovered several rich lodes, and it is expected that next spring will see a boom at the Lunenburg gold mines.

The reputation of the Salmon River and Albion mines will, in the opinion of an expert, be equalled by that of the Crow's Nest mine in Gysboro, the indications being that the latter mine will become an important gold producer.

Mr. Van Slooten is reported to have said that he has succeeded in raising \$1,000,000 of capital in England and the United States for investment in Cape Breton mines, provided the concessions asked for last winter from the local legislature are granted.

The discovery of auriferous deposits in the vicinity of Pleasant River, Queen's county, has caused some excitement in the district. The county has, in consequence, been visited by numerous gold prospectors, some of whom have been successful in their searches.

Work was resumed at the Coxheath copper mine in the beginning of December. About twenty hands were then employed and it was the intention to increase the force when work was well under way. This mine will be operated extensively by the Eastern Development Company, the present owners.

QUEBEC

The asbestos mines in the townships of Thetford, Colrairie and Broughton suspended operations at the end of November, and work will not be resumed until spring.

The Villeneuve mica mine continues to yield abundantly, and the output is of the same high grade as that which was shipped last autumn and established the reputation of the mine.

Since the death of Mr. Roberts, work has not been resumed at the Bristol iron mine in Pontiac county. Mr. Roberts was president of the company owning the property and it had his personal attention.

Work was suspended at all the phosphate mines in the du Lièvre district between the 24th of December and the 4th of January. The full force has resumed work and phosphate is coming to the surface as rapidly as ever.

The phosphate location, Lots 7 and 8 in the 7th Range of the Township of Bowman, has changed hands. The present owners have a force of miners at work developing the property and are confident that it will prove a rich and productive mine.

ONTARIO.

The *Cox Hill*, in the county of Hastings, is the only iron mine that was worked continuously in the province during the past year, and from it 30,000 tons of ore were raised, of which 10,000 tons were shipped to the United States.

Thunder Bay District.

It is reported that a mill for the reduction of silver ores will be erected at an early date at the *Rabbit Mountain* mine. There are now five working mines in the district.

The owners of the *Rabbit Mountain* have concluded arrangements to work their own mine and the adjoining property, known as 40 T., on an extensive scale.

A mill test, by Ballbach & Sons, Newark, N.J., of 2,785 pounds of pure ore from the east end of Silver Mountain, gave 1,039½ ounces of silver, which is highly satisfactory to the owners.

It is stated that the result of operations at the west end of Silver Mountain exceeds the most sanguine expectations, and that another rich outcropping has been discovered about one hundred feet to the west of No. 2 tunnel.

The new shaft at the Huronian mine is being rapidly sunk on the new vein, and the bottom of the shaft is in very rich ore. This vein has proved rich from the surface, and continues to improve. Work at the mine is progressing favorably, though but a small force is employed.

A new company, on the 16th December, completed the purchase of a part interest in the *Beaver*, *Silver Creek* and another mine. The force of miners at all three mines has been increased, and it is the intention of the company to put up a mill and reduction works in connection with these mines.

BRITISH COLUMBIA.

The discoverer of Granite Creek has discovered another creek which he calls the *Eagle*, and states that he thinks it will prove a much richer creek than *Granite*. Samples from rich quartz ledges have been sent down for assay.

On the Stewart river, 60 miles from its mouth, it is stated that the miners are taking out \$30 per day, per man, with rockers.

A large number of miners have gone into Scotch Creek where the diggings are reported to be very rich. The creek is easy of access, the steamer running direct to its mouth.

Nearly all the claims on Granite Creek shut down for the season about the end of November. A few miners continued to work as the weather was favourable. There are about 600 miners on the creek.

Parties arrived from Victoria in December from Granite creek had been to Eagle creek and Hine's gulch and report considerable excitement at the mines on account of the new strike, and that a large number of miners had proceeded to Eagle Creek and taken up claims.

An immense quartz deposit has been discovered on the Yukon river, which yields, according to rough assays, \$10 per ton. The facilities for crushing are ample, there being good water power and other necessities for milling the ore near at hand.

UNITED STATES.

A great mass of asbestos in North Georgia has been fully opened, and the product sells at \$40 to \$60 a ton.

In Colfax county, New Mexico, rich prospects have been discovered which, it is predicted, will prove an inviting field for a large number of mining companies.

The Gemaine Consolidated Co., Colorado, has struck a very fine crevice on the fourth level of the Bates-Hunter mine. The vein is twelve feet between the walls.

The output of Leadville mines, it is expected, will have reached \$12,000,000 for 1885. The place has about 100 producing mines, producing about 1,000 tons per day of the value of \$40,000.

It is reported that Mexican prospectors have discovered a rich gold ledge about fifteen miles south of Independence, California, specimens from which have assayed \$150 to \$200 in gold, per ton, besides a fair percentage in silver.

Notwithstanding the comparatively low price of copper, there has been an appreciation in the price of the shares of the Calumet and Hecla and seven other copper mining companies of Lake Superior since the 1st January, 1885, of about \$13,000,000 in the aggregate.

The Plymouth Consolidated Gold Mining Company has one of the most productive gold mines in America, situated at the town of Plymouth, Amador county, California. From June, 1883, to December, 1885, both inclusive, thirty-one consecutive monthly dividends have been declared of \$50,000 each, aggregating \$1,550,000.

The *Treadwell* gold mine on Douglas Island, Alaska, to which frequent reference has been made in these columns, is now classed among the greatest producers in North America. The lode contains an enormous body of low-grade ore, which is crushed in a 120-head stamp mill, and the tailings concentrated on 48 Frae belts. The concentrates (sulphurites) carry about \$80 a ton, and are to be treated by chlorination.

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Will examine and report on mines, and make analyses.
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Lots 25, 26, 27 and 28, in the 3rd range. Some excellent surface shows have been uncovered on these lots and only require capital for developing. Price and particulars given at the office of the MINING REVIEW.



WELLAND CANAL ENLARGEMENT.

Notice to Contractors.

SEALED TENDERS addressed to the undersigned and endorsed "Tender for the Welland Canal," will be received at this office until the arrival of the Eastern and Western mails on MONDAY, the 25th day of JANUARY next (1886), for raising the walls of the Locks, Weirs, &c., and increasing the height of the banks of that part of the Welland Canal between Port Dalhousie and Thorold, and for deepening the Summit Level between Thorold and Ramey's Bend, near Humberston.

The works, throughout, will be let in Sections.

Maps of the several localities, together with plans and descriptive specifications, can be seen at this office on and after MONDAY, the 11th day of JANUARY next (1886), where printed forms of tender can be obtained. A like class of information relative to the works north of Allanburg will be furnished at the resident Engineer's Office, Thorold; and for works south of Allanburg, plans, specifications, &c., may be seen at the resident Engineer's Office, Welland.

Contractors are requested to bear in mind that tenders will not be considered unless made strictly in accordance with the printed forms, and, in the case of firms, except there are attached the actual signatures, the nature of the occupation and place of residence of each member of the same; and further, an accepted bank cheque for the sum of Two Thousand Dollars or more—according to the extent of the work on the section—must accompany the respective tenders, which sum shall be forfeited if the party tendering declines entering into contract for the works at the rates stated in the offer submitted.

The amount required in each case will be stated on the form of tender.

The cheque or money thus sent in will be returned to the respective parties whose tenders are not accepted.

This Department does not, however, bind itself to accept the lost or any tender.

By order,
A. P. BRADLEY, Secretary.
Department of Railways and Canals, {
Ottawa, 9th December, 1885



Notice to Contractors.

SEALED TENDERS addressed to the undersigned and endorsed "Tender for Public Buildings, at Peterborough, Ont." will be received until TUESDAY, the 20th day of January next, inclusive, for the erection of Public Buildings, for the

POST OFFICE AND

The Customs and Inland Revenue Offices,

At Peterborough, Ont.

Plans and specification can be seen at the Department of Public Works, Ottawa, and at the office of J. E. Belcher, Architect, Peterborough, on and after FRIDAY, the 18th day of December next.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures. Tender for each building to be separate, and forms will be supplied for each.

Each tender must be accompanied by an accepted bank cheque, made payable to the order of the Honourable the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party decline to enter into a contract when called upon to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned. The Department does not bind itself to accept the lowest or any tender.

By order,
A. GOBEL, Secretary.
Department of Public Works, {
Ottawa, 7th December, 1885. }

TIMBER LIMIT ON LAKE WINNIPEG FOR SALE.

50 Square Miles.

This limit will be very valuable. Apply at the office of the MINING REVIEW for price and particulars.

FOR SALE, White Marble Quarry on Calumet Island.

At this quarry there is an inexhaustible supply of most beautiful white marble. Samples to be seen and information obtained at the office of the MINING REVIEW.



GRAND COLONIAL

Exhibition in London, Eng.
1886.

FIFTY-FOUR THOUSAND FEET RESERVED
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First Royal Exhibition Commission Since 1862.

THE Colonial and Indian Exhibition to be held in London, England, commencing May 1st, 1886, is intended to be on a scale of great magnitude, having for object to mark an epoch in the relations of all the parts of the British Empire with each other.

In order to give becoming significance to the event, a Royal Commission is issued for the holding of this Exhibition, for the first time since 1862; and His Royal Highness the Prince of Wales has been appointed President by Her Majesty.

The very large space of 54,000 square feet has been allotted to the Dominion of Canada by command of the President, His Royal Highness.

This Exhibition is to be purely Colonial and Indian, and no competition from the United Kingdom or from foreign nations will be permitted, the object being to exhibit to the world at large what the Colonies can do.

The grandest opportunity ever offered to Canada is thus afforded to show the distinguished place she occupies, by the progress she has made in Agriculture, in Horticulture, in the Industrial and Fine Arts, in the Manufacturing Industries, in the Newest Improvements in Manufacturing Machinery and Implements, in Public Works by Models and Designs; also in an adequate display of her vast resources in the Fisheries and in Forest and Mineral wealth, and also in Shipping.

All Canadians of all parties and classes are invited to come forward and vie with each other in endeavoring on his great occasion to put Canada in her true place as the premier colony of the British Empire, and to establish her proper position before the world.

Every farmer, every producer, and every manufacturer, has in eyes in assisting, it having been already demonstrated that the extension of trade always follows such effort.

By order,
JOHN LOWE,
Sec. of the Dept. of Agriculture.
Ottawa, 1st Sept., 1885.

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CANADIAN MINING REVIEW

VOL. 4.—No. 2.

1886—OTTAWA, FEBRUARY—1886

VOL. 4.—No. 2

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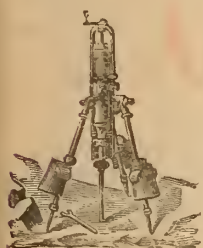
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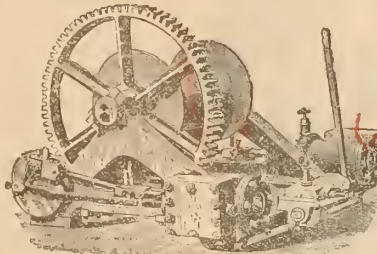
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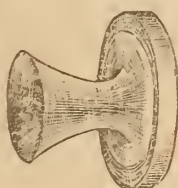
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At this quarry there is an inexhaustible supply of most beautiful white marble. Samples to be seen and information obtained at the office of the MINING REVIEW.



WELLAND CANAL.

Notice to Contractors.

SEALED TENDERS addressed to the undersigned and endorsed "Tender for Lock Gate Timber," will be received at this office until the arrival of the Eastern and Western Mails on TUESDAY, the 19th day of FEBRUARY next, for the furnishing and delivering, on or before the 22nd day of June next, 1886, of Oak and Pine Timber, sawn to the dimensions required for increasing the height of the Lock Gates on the WELLAND CANAL.

The timber must be of the quality described and of the dimensions stated in a printed bill which will be supplied on application, personally or by letter, at this office, where forms of tender can also be obtained.

No payment will be made on the timber until it has been delivered at the place required on the Canal, nor until it has been examined and approved by an officer detailed to that service.

Contractors are requested to bear in mind that an accepted bank cheque for the sum of \$600 must accompany each tender, which shall be forfeited if the party tendering declines to enter into a contract for supplying the timber at the rates and on the terms stated in the offer submitted.

The cheque thus sent in will be returned to the respective parties whose tenders are not accepted.

This Department does not, however, bind itself to accept the lowest or any tender.

By order,
A. P. BRADLEY,
Secretary.

Department of Railways and Canals,
Ottawa, 22nd January, 1886

WANTED.

Rock Breaker

State lowest cash price and give breadth of Jaws, diameter of pulley, and all particulars.

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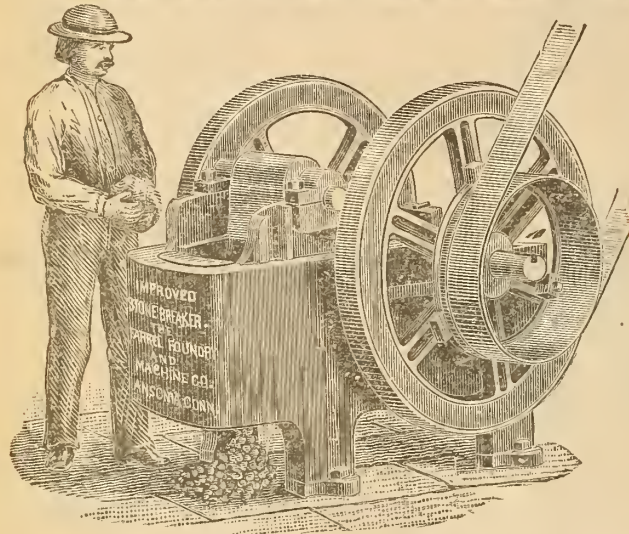
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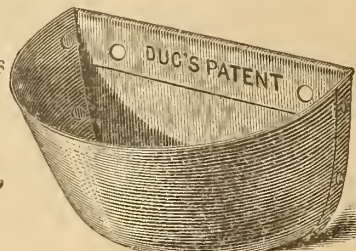
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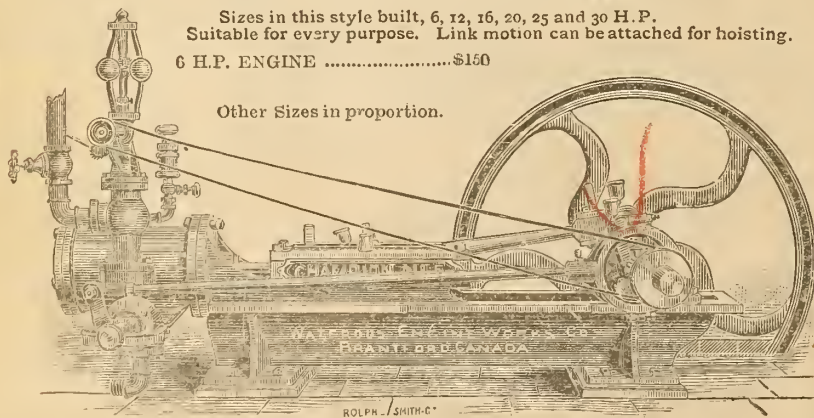
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UNION CHAMBERS, 14 Metcalfe Street.

The CANADIAN MINING REVIEW is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts as well as others interested in Canadian Mineral Lands are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 20th of the month.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

The opening up of new tracts of country throughout the length and breadth of the Dominion by means of railway enterprises and exploration in the interests of our lumbermen is concomitantly bringing an increased number of mineral occurrences to view. Comparatively few people in Canada seem to realize the importance to a country of encouragement to mining industry, and among certain classes mining is looked upon in no other light than that of speculation, while some people go so far as to term it a gambling operation. Farmers have been known to come to hopeless grief in attempting to prosecute farming on legitimate principles; but who will deny that the largest source of wealth is derived from cultivation of the soil? Because investments in timber limits have, in some instances, proved unprofitable, it must not be said that our lumbering industry has not benefited the country; and because the majority of mines do not pay large dividends, can we question the fact that every ounce of economic mineral brought to the surface represents so much additional wealth to the country in which it is mined? Mining is a steady source of revenue to the older countries of the world, and it might be made a very important and remunerative industry in Canada, and one that would add materially to the wealth of the Dominion. The importance of utilizing natural mineral wealth is so well recognized in Germany that the Government works the majority of the mines. In France all mining engineers

are Government engineers; and in England the Government supplies inspectors in all the mining sections, and a record-keeper to collect statistics, while private enterprise does the rest. What is the Government of Canada doing, and what has it ever done, toward furthering and encouraging the development of our mineral resources?

The vast extent of Canada's territorial possession renders it practically impossible for the staff at present employed on the Geological Survey to do more than devote attention to the geological features of the country. It is of course very important that we should have a knowledge of the geological formation of our Dominion, but that her mineralogical features should be almost entirely neglected is not to the best interests of individuals, of our people as a whole, or of any section of our community. A mineralogical and mining department should be attached to the Geological Survey, whose duty it would be to collect and dispense information relating to the mineral deposits in all parts of the Dominion, and to keep records of mining statistics. Up to the present day we have no official record of what has been accomplished by Canadian miners, and no official reports relating to our mineral deposits to which capitalists or any one who may desire to engage in legitimate mining can refer. In a few weeks the mineral resources of Canada will be represented at the Colonial and Indian Exhibition in London by upwards of 725 exhibits, which will doubtless lead to enquiry for reliable information concerning the extent and nature of the deposits. From what official records can this information be supplied? Before capitalists can be induced to invest their money in mining enterprises they must be well informed by some unprejudiced and disinterested authority, and what could be more authentic than the official reports and records of a Mineralogical and Mining department of the Geological Survey? Yet such a thing does not exist.

We have stated in former numbers of the REVIEW that capitalists are making enquiries for mineral lands with a view to investing in them and engaging in active mining operations. Such enquiry continues, but while owners of undeveloped properties hold them at exorbitant prices, capital will seek investment elsewhere and the advancement of our mining industries will be impeded. A mine may be purchased without risk as there is no difficulty in arriving at its actual value, but a prospect must be looked upon purely as a speculation; it may prove worthless and, possibly, it might develop into a bonanza. The investor who risks his money in a prospect should, therefore, not be expected to pay as much for it as he might be disposed to give for a developed mine. Capital is the agent we most require in Canada to successfully build up and develop great mining industries. With its assistance much could be accomplished; without it we are helpless to avail ourselves of the mineral wealth

which Nature has so lavishly deposited for our use. Let us, therefore, offer some inducement to capitalists to invest in mining enterprises in Canada and not drive them from us by allowing them no margin for profit on their investments.

Mr. L. H. Shirley, M. E., of Montreal, and Mr. John Lamb of Toronto have, during the past month, made an extended tour through the phosphate district of Ottawa County and visited all the mines in operation. They report having seen some promising undeveloped deposits and that a very large quantity of ore is being raised at the mines.

Dr. Selwyn, Director of the Geological Survey, sailed from New York on 11th inst. by s.s. *Britannic*. The Director has gone to England to see that everything is in readiness to receive the Canadian mineral exhibit for the Colonial and Indian Exhibition, and to personally superintend its arrangement. He will remain in England until the Exhibition closes.

Mr. T. S. Higginson returned recently to Ottawa from the Rocky Mountains, where he had been exploring for the past year, and speaks in the highest terms of the prospects for mining in that region. He has brought with him some wonderfully rich specimens of gold-bearing quartz and argenteriferous galena from discoveries he himself made, the analysis of which have shown the quartz to carry a very large quantity of gold and the galena to yield upwards of \$500 in silver to the ton. Mr. Higginson will return in the spring and proceed to open up and develop these locations.

THE PHOSPHATE TRADE.

The phosphate miners in Ottawa County have done good work since the shipping season closed last autumn, and the piles of ore that have accumulated at the various mines offer an imposing sight to people passing through the mining district. Never in the history of this industry in Canada has there been, so early in the year, such a large quantity of ore mined, dressed and awaiting shipment, as there is in stock at this date; and mine owners will not relax their efforts to keep up, and perhaps increase, the average monthly output, which, for the past five months, has run far in excess of the average for the same period in former years. Everything at present points to a largely increased production for this year, and there exists no doubt that during the shipping season of 1886 many thousands of tons will go forward in excess of last season. The quality of the ore, too, is quite up to the standard of 1885, which was as high a grade as has ever been shipped from any phosphate deposits in the world. During the past two years, owing to the attention miners have given to dressing the ore, the product of Canadian mines has found much favor abroad with manufacturers of superphosphates, and as the production increases, as it is steadily doing year by year, in the

same ratio will the industry advance in importance, until the time may arrive when Canadian phosphate will rule the foreign markets instead of the value of our output being regulated, as it is to-day, by importations into England and Europe from the mines of other countries. Miners are

PREPARING FOR EARLY SHIPMENTS, evidence of which is to be seen at the various shipping points along the bank of the river du Lièvre, where thousands of tons have already been deposited in readiness to be forwarded as soon as the ice will have left the river. Some ore has been forwarded from the mines in sleighs to the C. P. R. terminus in order that the earliest tonnage may be taken advantage of when navigation opens from Montreal in the spring; but, as this is much more expensive transportation than floating the ore in scows down the river, a small percentage of the output has been sent down this winter.

Several new mines have been opened since last season in the townships of Templeton and Bowman, some of which are yielding ore in liberal quantity and of a high grade, and promise to develop into heavy producers. The older mines in the townships of Buckingham, Portland East, Portland West, and Templeton—such as the "Emerald," "Little Rapids," "North Star," "High Rock," "Star Hill," and the "McLaurin & Blackburn" mines—are turning out more phosphate, and of a higher grade, than at any time since they were first opened. The mines are, for the most part, suitably equipped for economic mining; work is being carried on under better management, and more systematically than formerly; and the facilities now afforded for transportation have reduced this item to almost a minimum of cost; the market abroad continues steady, and it is expected that the rate of freight for the coming season from Montreal to foreign ports will not exceed that of last year. Taking into consideration all the important facts we have enumerated in connection with this important industry, it is not unreasonable to predict a most profitable season for Canadian phosphate miners.

STRIKING COLLIERIES.

Nearly one thousand hands went on strike at the Cumberland Railway and Coal Company's mines on the 12th inst. These mines have been known formerly as the Spring Hill mines, N. S., and are the largest collieries in Canada. The strike arose among the cutters working in the north slope, who complained of the unsafe condition of their working places and demanded higher pay in consequence. The manager, Mr. R. G. Leckie, would not accede to their demands and a general strike ensued. It was then proposed that a workmen's committee should be formed to examine the condition of the slope and report to the managers, who expressed a willingness to abide by its decision. Meanwhile the boiler was blown out, the fan stopped and all operations suspended. After the committee had carefully examined the cause of the grievance it decided in favor of the company and work was resumed, the men starting in again on full time. Anything in the shape of accident or strikes that occur to hamper the full working of these collieries is a serious matter and practically a public misfortune.

CANADIAN PHOSPHATE DEPOSITS.

OFFICIAL REPORT

By THOS. W. HOTCHKISS, ESQ., U. S. CONSUL AT OTTAWA.

In Mr. Hotchkiss's report to the Consular Bureau at Washington he attaches much importance, and justly so, to the rapidly growing phosphate industry in Canada. The statistics of this trade which he has embodied in his report vary somewhat from the figures which have, from time to time, been published in these columns, but they are sufficiently accurate to enable those who read them to arrive at a fair idea of the magnitude to which phosphate mining in this district will attain. Mr. Hotchkiss has advanced theories and presented many points for the consideration of those who are engaged in the manufacture of fertilizers in the United States from mineral phosphate; and, while it cannot be expected there will be a consensus of opinion on all the issues he has raised, it is not unlikely that his report will lead to close enquiry into the actual relations which now exist between the phosphate miners of Canada and the manufacturers in England, Europe and the United States, and may be the means of opening up a new market for the product of Canadian mines.

The Consul's report is as follows:—

"There are but two important industries materially affecting the interests of the United States, connected with this Consular district, viz, the manufacture of white pine lumber and the mining of "apatite" or mineral phosphate of lime.

It is within the last ten years that the discovery was made of the important deposits of apatite in the apparently barren hills of Quebec and Ontario; but for several years all efforts made in its behalf were of an experimental character, and only within three or four years has any practical development of the deposits been prosecuted, or the real value and merit of the mineral as a fertilizer been established.

When, by analysis and actual use, it had been demonstrated that this mineral was composed of 80 to 90 per cent. of phosphate of lime, the interest of wide-awake men, commercially and speculatively, was drawn towards it, until it bids fair to become a powerful factor in the industries of this section. Its development and production is rapidly increasing, and as the profits, thought to be very great, become more widely known, it is reasonable to expect a still more rapid development.

SITUATION OF THE DEPOSITS.

Examining the map of Canada it will be found that the Ottawa River is the dividing line between the province of Ontario and the province of Quebec. Crossing the Ottawa at Ottawa City (which river is navigable from Ottawa City to its confluence with the Saint Lawrence, near Montreal), we are in the province of Quebec; continuing northerly for eight miles will bring us into the township of Templeton, in the county of Ottawa, and the region of the phosphates. Go north-east from Ottawa City 20 miles, and the township of Buckingham is reached. Here will be found the best deposits that have as yet been developed. All this district lies less than 70 miles north of Ogdensburg, N. Y.

New discoveries are constantly being made, and new "phosphate properties" offered in the market. Other deposits, however, less in extent and value, are found in other parts of the Dominion.

EXTENT OF MINING.

In the earliest stages of this mining it was conducted in a rude, primitive manner, as well from want of capital as lack of the necessary experience, and as usual in such cases with doubtful success. In a few cases it must be admitted, through the failure of the deposit, it resulted in the suspension of the enterprise.

In the last year matters have immeasurably improved. British and American capitalists have so increased their means and abilities that the industry is placed in a lucrative condition.

SHIPMENTS OF PHOSPHATE.

The following table will show the shipments from Canada for the past three years of crude apatite:—

Years.	Quantity.	Value.	Value at Montreal.
	Tons gross.		Per ton.
1882	16,585	\$333,019	\$20 08
1883	19,466	421,963	21 67
1884	23,000	519,000	20 25

The shipments for 1885 are known to exceed 25,000 tons. The district alluded to mined in 1884 20,353 tons, the balance of the output for that year going from the smaller workings along the Rideau canal in the vicinity of Kingston.

When the Canadian phosphates were first introduced in the market they were naturally looked upon with great suspicion, through a want of reliable knowledge of their value as a fertilizer; but at this time the condition is entirely reversed, every pound of the output being contracted for in advance of its production.

As mined it is of every shade of color, from a light gray to nearly black. From irregular "pockets" in small deposits, as well as in large blocks and masses, in apparently inexhaustible volume—superficial, shallow, and down deep in the bowels of the hills—now mixed with pyroxenic rock, gneiss, mica, etc., which usually accompany the deposit in this country, to solid masses of almost pure phosphate.

QUALITY OF THE DEPOSIT.

Being a more concentrated phosphate than is known to exist in quantities in any other part of the world, it is greatly sought for to bring up the acid phosphate fertilizer to a high percentage of phosphoric acid.

Regarding the value of this "apatite" as a fertilizer, a reliable authority states that Canadian phosphates contain 89.91 per cent. of tri-basic phosphate of lime, according to a most authentic analysis. A comparative table of the analytical composition of phosphates recently published shows that with the exception of three limited deposits in the West Indies, and one in Spain, the Canadian apatite ranks the highest. Also recent foreign official reports show that in those portions of Europe where the sugar-beet is extensively cultivated—France, Belgium and Denmark, notably in France—no fertilizer has been found to equal the mineral phosphates of Canada.

MARKETS.

To the present time the demand has been entirely European, mainly in Great Britain and Germany, though France would take the entire output if she could secure it.

But 254 tons in 1883 and 221 in 1884 went direct to the United States, while Great Britain exported to the United States in 1883 1,262 tons of crude and 7,766 tons of manufactured or superphosphates—this latter (and possibly the "crude") undoubtedly being Canadian crude chemically treated and returned to America.

The statement of a member of the Canadian Geological staff, that "much of the material mined in Canada, sold and exported to Europe, has been and still is re-shipped to the United States, either in a raw or manufactured condition," confirms what the statistics seem to show. Mr. Torrance, of the Canadian Geological Survey, in his last report on the phosphates of this district, also states that "as 1,262 tons of crude phosphate and 7,666 tons of superphosphates were imported into the United States from Great Britain last year, it is highly probable that a very considerably quantity of our Canadian apatite has been used in enriching American lands, after a voyage across the Atlantic and back to the United States."

Here we have indubitable authority that this state of affairs prevails. Does it not become us speedily to seek the cause? It is surely extraordinary in the face of the admitted shrewdness of even the average American merchant. Does it not also suggest the possibilities for fraud and adulteration?

Is there not in this risk alone sufficient to appeal to the intelligence and shrewdness of the American dealers in phosphates and fertilizers? If not, let us see what benefactors our German friends are to the agricultural interests of the United States. This may assist towards sounder views of "protection."

IMPORTS OF PHOSPHATES INTO THE UNITED STATES.

The importation of crude phosphates into the United States in 1883 and 1884 from all countries was as follows, viz:—

Countries.	1883.		1884.	
	Tons.	Value.	Tons.	Value.
Danish West Indies	275	\$ 865	240	\$ 1,563
France	102	682	...	...
Germany	44,033	367,970	10,181	63,747
England	1,262	24,081	8,567	156,772
Canada	254	4,420	221	4,025
British West Indies	2,547	25,088	1,375	9,270
French Guiana	250	2,059	125	500
Haiti	235	1,767	590	2,330
Cuba	199	857	81	491
Porto Rico	231	1,625	530	5,115
Dutch West Indies	2	26	...	...
Total	49,381	\$429,391	21,910	\$243,843

Average value, per ton—1883, \$9.78; 1884, \$11.08.

The foreign buyers of Canadian phosphates pay from \$12 to \$18 per ton for it here, and have paid \$20 for 80 per cent. phosphate, delivered on boats at the river (to be taken to Montreal for ocean shipment).

The table shows that the average value delivered in the United States from England, Germany, etc., was \$9.78 and \$11.08 per ton for the years 1883 and 1884 respectively, and also states the market value here, where produced, about \$13 per ton (never less than \$12 per ton) for 80 per cent. phosphate. I ask: on what hypothesis or by what method of higher arithmetic can this character of commercial traffic be satisfactorily explained other than through the medium of gross adulteration?

By the table given of Canadian production it will also appear that the Canadian phosphates would have supplied one-half the United States demand in 1883 and the entire demand in 1884.

But again, to summarize the case, it apparently shows that the average cost of Canadian crude, as paid by the foreign buyers in 1883, was \$21.67 per ton; that the average value as entered in United States customs, imported from foreign countries in 1883, is \$9.78. It was purchased in the lump, freighted to Europe, there crushed and pulverized by grinding or otherwise, and returned to the United States valued at half its original cost.

When we consider that Canadian phosphate yields 75 to 90 per cent. of pure phosphate of lime, and that its equal in purity is not found elsewhere in any appreciable quantities, is it not

surprising that its intrinsic value should be so little recognized by those who require it to the extent which characterizes the known wants of American agriculturists? And, too, when by a little effort on our part (I speak as an American) every pound needed can be mined here by American industry, placed direct in the American market in its purity, and at a largely reduced cost, quality considered.

MINES.

The Emerald and Star Hill mines, owned and worked by American capitalists, it is stated paid dividends of 30 per cent. to their shareholders last year.

The High Rock mine is owned and worked by an English company, while several smaller interests are worked by individual Canadian enterprise. Up to October 1st, 17,853 tons had gone forward during the present season.

The system of mining is constantly being improved as experience dictates its necessity, the variability of its stratification compelling frequent changes in method in the interest of economy.

The larger portion of the productive workings are on the bedded deposits; these, however, for the most part are opened only by shallow pits, a condition of things which is explained by the peculiar character and the frequency of the deposits, as also by the economic value of the apatite reached.

This mineral, unlike ordinary ores, is in its crude state a merchantable article of considerable value locally, and finds a ready sale even in small lots of 5 and 10 tons.

The average cost of mining at the better developed deposits is said to be about \$3 per ton, gross. Three to four dollars per ton will place it in Montreal for foreign shipment, or thence by the Lake Champlain route to New York; or about the same cost will put it at any of the shipping points between Montreal and Kingston, on the St. Lawrence River, for re-shipment to the frontier ports of the United States, on any or all the lakes to their western limits. It is well known that any freight of this character moving west by water is carried at nominal figures for its benefits as ballast.

USES OF PHOSPHATES.

The demand for proper fertilizers is limitless, and must remain so.

"The grain exported from Montreal alone, in a single year, has been estimated to contain 2,574 tons of phosphoric acid, which implies the total exhaustion, so far as phosphates are concerned, of 75,000 acres of wheat land, the renewal of which would necessitate the application of 6,000 tons of phosphates." If this be true—and it comes from the highest authority—what could be written of the stealthy exhaustion of the great agricultural districts of the United States, and their present and future necessities?

What possibilities through this crude mineral await the redemption of those hundreds of thousands of acres of once valuable Southern lands "corned to death," and now lying to waste in worthless "sage grass," begging for buyers at \$1 per acre and even less?

What possibilities also await the enterprising American who shall engage in this business of bringing this wealth, now hidden in these mountains, to the doors of the American agriculturists?

OPPORTUNITY FOR AMERICAN CAPITAL.

If any prejudice exists as regards Canada, its climate, or its people, I answer that it is misplaced. The people may not be quite as bold and venturesome in enterprise as Americans, but are just as reliable and industrious, and as fully appreciate the dignity of labor.

No people under the sun entertain a more friendly or more exalted regard for the Americans and their characteristic vim, push, energy and shrewdness, than do the Canadians. This is outspoken and unquestionable. There is no class of newcomers who will be more heartily welcomed than the enterprising American. The general good health is seen in the countenances and in the actions of the people. The school system is in all respects fully equal to the educational facilities of the United States. The habits, customs and social atmosphere of the Canadians will not be found uncongenial to Americans.

The cost of living is fully equal in all respects to that of any portion of the Northern States, but not greater. Taxes are a trifle lighter.

Mechanical and day labor does not materially vary from that prevailing in the State of New York, outside of New York City. Shipping facilities are first-class, and freight rates are in general keeping with the ordinary course of rates in the Northern States, which is the natural result of that grand system for transportation so liberally fostered by the Dominion government.

I cannot close this already lengthy report without calling especial attention to the apparent apathy of American capitalists towards this enterprise, which not only promises such remunerative results, individually and commercially, but which is of such vast importance to the agricultural interests of the United States.

If the statements made and statistics given are reliable, is it creditable to the alleged business sagacity and far-seeing and far-reaching proclivities which are supposed to be so characteristic of the typical American, that this apparent non-interest should exist towards this promising enterprise?

The United States Government admits this article free of duty, and the Canadian government and people are inviting us to come and get it. Neglecting to do this, we are allowing Continental Europe to gobble every pound of the production, pay the freight twice across the ocean, with all the incidental expenses attached to such procedure, and with no known check on its adulteration we complacently purchase it at last at a value that necessitates its re-sale to the agricultural community at a price that virtually amounts to prohibition.

I ask, are not national as well as commercial issues involved in this matter?

(Signed) THOS. W. HOTCHKISS.

United States Consulate,
Ottawa, November 23rd, 1885.

ASBESTOS MINING.

This has become one of the most important industries of the Eastern townships, and the annual production of asbestos of superior quality is increasing year by year. In a few years hence the shipments from the various mines will doubtless have assumed large proportions, as the deposits are sufficiently extensive to be capable of yielding this valuable mineral in much greater quantity than miners have yet attempted to produce. For the season of 1885 the shipments from the district aggregated about 1,500 tons, to which the following mines contributed, approximately, the amount set opposite their respective names:—

Johnson's Company mine..... 383 tons
Boston Asbestos Packing Co.'s mine. 379 "
King Brothers' mine..... 198 "
Ward mine..... 102 "

The ruling price obtained for the output of last season was \$80 per ton (2,000 lbs.) delivered

on the cars of the Quebec Central Railway, which runs alongside the mines, as it came from the pits, without classification of quality. Work at these mines is usually suspended about the 15th November of each year and resumed about the 15th April following. It is thought, however, that operations can be prosecuted profitably the year round, and the experiment is being tried the present winter by the Anglo-Canadian Asbestos Company at its mines at Black Lake. If this company can successfully demonstrate the practicability of mining asbestos to advantage during the winter months, other mine owners will of course follow its example and the industry will thereby be greatly stimulated. The quality of the mineral has gained a world-wide reputation, and as the production increases so will the demand expand in like proportion.

MICA IN CANADA.

It is within the past two years that mica of the best quality, known as *Muscovite*, has been discovered in Canada in marketable sizes and in paying quantity, and to-day we know of several deposits capable of being developed into fairly productive mines. Two in the county of Frontenac, province of Ontario, show well-formed, large crystals at the surface embedded in white quartz; another in Wakefield, county of Ottawa, has been uncovered and numerous crystals have been exposed, which, though small, are of excellent quality; in the Lake Superior and Lake of the Woods districts good mica has been discovered in paying quantity, and a company has been formed in Winnipeg to work an important deposit in the last mentioned locality. In British Columbia also a fairly good quality is known to exist, but no attempt has yet been made to prove the sizes of the available crystals or the extent of the deposits in that province. Some small amount of development work has been done on a deposit about 60 miles from Berthier, east of Montreal, but work has for some time been suspended at this point for reasons unknown to us. The *Villeneuve* mine in the county of Ottawa, of which mention has frequently been made in these columns, has been worked continuously during the past year and has produced many thousands of pounds of mica, perfect in quality, and in sizes varying in dimensions from the ordinary sized sheets used in stoves up to plates measuring 14x12 inches. This mine yields a steady output, and with a little more development will be capable of yielding an almost unlimited annual production. Some specimens of mica have been forwarded from the Villeneuve mine to the Colonial and Indian Exhibition, and we will be much disappointed if they are not pronounced by judges to be of equal quality to any that is produced in any quarter of the globe. Samples that were sent to the Antwerp Exhibition last year created much surprise among the mica dealers of Europe, some of whom expressed a preference for its quality before what they had been receiving from East India and North Carolina.

EXPORTS OF IRON AND STEEL FROM GREAT BRITAIN TO THE UNITED STATES.

	Eleven months ended Nov. 30.		
	1883.	1884.	1885.
	Gross tons.	Gross tons.	Gross tons.
Pig iron	269,395	151,154	99,632
Old iron for manufacture	42,005	24,822	10,359
Steel, unwrought	27,336	12,726	12,570
Tin plates	201,760	195,973	207,318
Hoops and sheets	23,115	19,847	20,861
Bar, angle, bolt and rod ..	8,328	4,171	2,010
Railroad iron	69,269	17,829	5,469

Colonial and Indian Exhibition.

Canadians, especially those who are interested in the mineral resources of the Dominion, will be gratified to learn that their country will, in all probability, take the lead with her exhibit of the product of the mine at the great Exhibition which will open in London, England, on May 1st. During the past decade of years the mining industries in Canada have advanced so rapidly that we are able to-day to send to London upwards of 725 exhibits of ores and minerals and their products, whereas but 549 specimens were exhibited at the Centennial Exposition at Philadelphia in 1876. To this department each of the provinces, with the exception of Prince Edward Island and Manitoba, has contributed very creditable exhibits, which will, no doubt, be carefully classified and arranged on their arrival in London, so as to be seen to best advantage, under the supervision of Dr. Selwyn, Director of the Geological Survey, and his able assistant, Mr. Chas. W. Willmott, who will shortly proceed to England to take charge, under Dr. Selwyn, of Canada's mineral department in the Exhibition. As far as we can learn the different provinces have forwarded mineral exhibits as follows:—

NOVA SCOTIA.

Gold, Silver, Copper, Antimony, Lead, Manganese, Iron, Coal, Gypsum, Barite, Infusorial earth; also building materials—such as Granite, Sandstone, Brick, Drain Tiles and Lime. This province will be well represented and her exhibits will be as attractive as those from any of her sister provinces.

NEW BRUNSWICK

has forwarded exhibits of Copper, Antimony, Manganese, Iron, Coal, Albertite and Infusorial earth; besides granite columns, red and grey, from the St. George quarries, and the products of other quarries, all dressed to show tooling, etc. The province of

QUEBEC

has contributed Gold Nuggets from Beauce district, Copper, Antimony, Nickel, Manganese, Iron and Chronic Iron ores; also a fine exhibit of Apatite, Mica, Asbestos, Graphite, Celestite, Magnesite, Soapstone, Potstone, Felspar and Iron Ochre. Amongst the above are some rare and very valuable specimens—notably a solid block of graphite, forwarded by Mr. Walker of this city, weighing 3,000 lbs.; a specimen of apatite, from the McLaurin & Blackburn mine in Templeton, weighing 1,600 lbs., and a magnificent apatite crystal weighing 500 lbs., the property of Mr. W. A. Allan of Ottawa. In addition to the foregoing there are some fine specimens of marble, cut and polished, together with samples of Granite and Porphyry from various parts of the province. The Canadian Granite Company, whose extensive works are in this city, have exhibits of beautifully dressed and polished granite, marble and serpentine columns from their own quarries, and some artistically turned serpentine card receivers. Quebec also forwards a vast variety of specimens of her building stones dressed to a uniform size and showing the various dressings, thereby enhancing the value of superior stones and detracting from those of an inferior character.

ONTARIO.

This province has sent Gold-bearing and Silver-bearing ores and some very fine specimens of the Sulphide of Silver from Rabbit Mountain (Lake Superior District). Lead, Copper and Iron ores are also well represented, the latter by about 40 specimens from all parts of the province, weighing from 50 to 300 lbs. each.

A handsome specimen of Barite from Pakenham, pure white, is worthy of mention. Gypsum from Brant county and neighborhood, Salt and Brine, Apatite, Mica, Molybdenite, Pyrite, Pyrrhotite, Kaolin and Lithographic stone are among the exhibits. Besides these there are some fine columns of marble and granite and dressed building stones from a large number of quarries, many of which cannot be surpassed for beauty. Mr. Waterman of London, Ont., has forwarded a large exhibit of Petroleum and its products. Brick and Drain Tiles, for which the province is famous, are also well represented, and it is expected that a large collection of mineral specimens will be forwarded from the Thunder Bay mining district. From the

NORTH WEST TERRITORIES

there are some fine specimens of Coal, taken from the Galt and Banff mines and from other localities; and

BRITISH COLUMBIA

contributes a collection of Gold from numerous claims, Silver-bearing ores, Copper (native and sulphide) and Iron ores. She also sends fine specimens of Coal weighing from two to four tons, including anthracite from Queen Charlotte Islands. These, in addition to cut and polished blocks of marble and cubes of building stones, make for our western province a good display.

The foregoing will give some idea of the extent of the Canadian mineral exhibit. The care with which all the specimens have been selected is sure to make this department one of the most interesting of the Exhibition and should attract foreign capital to the country for the development of our vast and rich mineral deposits.

HURONIAN MINE.

Frequent reference has been made in these columns to the operations which have been in progress at this mine during the past year or more, and it will, therefore, be of interest to some of our readers to know the present condition of the mine, and to learn of the many natural advantages the property possesses as a mining location.

The *Huronian* gold and silver mine is situated 75 miles from Port Arthur, to the westward, and 50 miles from Savanne station, a point on the Canadian Pacific Railway. During the past year this mine, at which there is a ten-stamp mill, with amalgamated copper plates for free milling and Frue vanners for concentrators, has been tested by its own mill-work with most satisfactory results, and proved to be a very valuable property, capable of a large production, and for which the mine is being developed and equipped. The main shaft is down 150 feet, and a second level has been started. The aggregate of the levels already driven is 260 feet, and a winze, now being sunk to meet the first level, is down 75 feet. The mill tests have shown that the entire vein-stone of the lode is pay-ore; and the vein, which is a true fissure cutting the stratification of the Huronian talcose slates, which form the country rock, has an average width of 5 to 6 feet. In places this vein produces rich sylvanite ore, a compound of gold, silver and tellurium, which is selected for smelting without being put through the mill. The vein-stone is uniformly charged with sulphurets, besides showing a considerable sprinkling of free gold. Not long since a segregated vein, large and rich enough to be worked profitably, was discovered, running with the formation and joining the main fissure about midway between the shaft and the mill. Near the point where it intersects the main vein the winze is being put down,

it being thought desirable to find their junction in the drifts to the south-west, where an unusually rich body of ore is supposed to exist.

The property is well supplied with good timber for fuel and all mining purposes, and a saw-mill attachment to the stamp-mill produces all requisite lumber. A small stream runs through the property in a valley which forms an excellent meadow for hay and pasturage; and on the location, which covers an area of 160 acres, there is good arable land for the production of cereals and root crops. The mill is supplied with water from a small lake on high ground near by, and in every way the mine is admirably situated for working. These important advantages, together with the fact that the veins are so reliable, render it not unlikely that the *Huronian* will make for itself an enviable name as an extensive producer and a dividend-paying mine.

A company has applied for a charter for a railway to connect this mine with the Canadian Pacific Railway and Port Arthur. It is expected that the line will be in course of construction within a few months, and when completed it will not only be of great service to the owners of the *Huronian* mine, but will pass through the new silver region to the west of Port Arthur and supply the miners now working there with railway facilities, of which, at the present time, they are seriously in need.

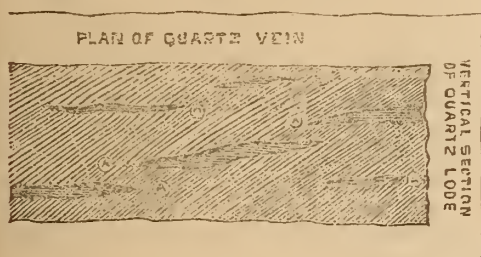
"PAY STREAKS."

NOVA SCOTIA GOLD FIELD.

By G. Henry Kinahan, M.R.I.A., etc., Dublin, Ireland.

To the *Editor Canadian Mining Review*.

In the paper on the Nova Scotia gold mines read before the meeting of the American Institute of Mining Engineers at Halifax, Mr. Gilpin regrets that no deep sinking has ever been made below the *pay streaks* to learn whether they set on again or not in depth. I, however, would suggest that perhaps drivings or cross-cuts might be better, if made across the quartz lodes whenever the *pay streak* thins out, either in depth or length. The accompanying rough sketch will represent either the plan or the vertical section of a quartz lode:—

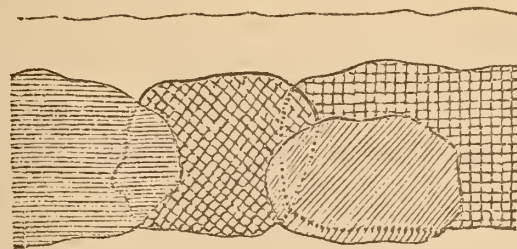


In its shrinkage fissures formed (A, A, A, A, A, A), to be subsequently filled with minerals or metallic ores. Such fissures are not uncommon in lodes, the so-called "strings" or "leads" in many lodes being filled up small fissures of this class. They, however, in some ground occur of a magnitude sufficient to be compared with the *pay streaks* of the gold miners, as was the case in the *Cronebane* mine, Ovoca, Co. Wicklow, Ireland. In this mining sett there is a wide mineral channel made up principally of "iron-masked" or pyritous rocks. On or along the north or "footwall" of the channel lay the "great sulphur lode" (iron pyrites), while in the ground between the sulphur lode and the south or "hanging-wall" the copper lodes occurred. The latter appears to me important, as the mode in which they occurred may bear on the nature of the *pay streaks*.

The *Cronebane* copper veins occurred in vertical lentils of various thicknesses, lengths and

depths, that, nearly invariably, gradually died out; the paying portion of one lentil seldom overlapping the paying portion of the next.

SURFACE



Longitudinal plan showing cakes of copper ore in four distinct lentils and the mode of the overlaps. In the mines the lentils were usually much greater in length than in depth.

Experience taught the miners that it was a waste of time and money to follow a lentil in depth or length; while if they drove horizontally across the ground they might come to a "copper streak," on following which they came to a paying lentil.

It is evident that the quartz veins of Nova Scotia must have shrunk, as otherwise the lentils now occupied by the *pay streaks* could not have been formed. During the shrinkage of the quartz vein one continuous fissure might have formed; this, however, does not appear to have been the case in any recorded instance; therefore it is natural to suppose that, as at the *Cronebane* mine, a number of minor fissures were formed, each one beginning in length or depth at or near the end of that in its neighborhood, as roughly represented in the sketch. To test whether the *pay streaks* are of a similar nature to the copper veins of *Cronebane* should not cost much time or money, and if the trials were successful the resources of this field would be considerably augmented.

I may mention that in depth the *Cronebane* copper lodes were cut out by the sulphur lode underlying considerably southward—a string coming into the vein from above (a "feeder") made the vein rich, while a "dropper" or one going down from the vein, made it poor.



Vertical lode with a "feeder" and a "dropper," *Cronebane* mine, Ovoca, Co. Wicklow, Ireland.

Copper Smelting at Sydney Harbor, Cape Breton, N. S.

The proposed operations of the Coxheath Copper Company at their property on Sydney Harbor, Cape Breton, include a railway, narrow gauge, about six miles long, from the mine to Sydney Harbor, a large smelting furnace, and an extensive refining and concentrating establishment. The shafts are to be deepened and levels started to yield 100 tons of ore a day. The natural facilities for smelting copper ore in Sydney Harbor are unsurpassed even by far-famed Swansea. The coal seams yield an excellent coke, one ton of which will smelt eight tons of ore. Limestone and iron ore are abundant in the vicinity of the furnace site. Already foreign miners and exporters of copper ores are enquiring about the terms on which their ores can be purchased by the Coxheath Company, who feel confident that with the natural facilities of their ores and position they can deliver *matte* or refined copper to the English or Continental markets at figures far below those now quoted.

CORRESPONDENCE.

Iron Smelting in Nova Scotia.

Editor Canadian Mining Review.

HALIFAX, N.S., January 31st, 1886.

DEAR SIR,—The question of iron smelting has, as shown by Mr. Bartlett's paper referred to in your last issue, long engaged the attention of Canadian speculators. At present I believe that in Nova Scotia only is there any iron smelting. A review of Mr. Bartlett's paper speaks of the Londonderry Iron Works as if from their start some thirty years ago large expenditures had been continuously made on them. I have always understood that the early operations for the manufacture of charcoal pig were economically and successfully conducted, and I know that the troubles did not begin until the attempt was made to erect a large steel-making plant. Owing to well understood reasons, large amounts of capital were unnecessarily expended, and the problem of steel making was not solved. For several years past the furnaces have made large amounts of excellent pig, which has been largely made into bar iron, and the present "liquidation" is for the purpose of re-arranging the company on the basis of iron, not steel making. Should the contemplated amalgamation with the Springhill Collieries be consummated it is expected that the place will be remodelled to meet the present requirements of the Canadian iron and steel trade. Experience has shown that iron can be made here at cheap rates, but the difficulty has been the low price of English pig, and the nominal freights on it from Liverpool to Quebec and Montreal, which allow it to be carried as ballast. There are also other difficulties incident to breaking in on the relations between sellers and the English makers which have retarded the progress of Nova Scotian iron in the upper provinces. However, it is certain that the quality of the Londonderry iron made from a high grade ore is gradually gaining for it a sure foothold in our various markets, and as the prices of English iron appear to have reached the lowest point, the prospects are that the Nova Scotia iron business will have a good future before it.

X.

MANCHESTER, ENGLAND,
January 15th, 1886.

Editor Canadian Mining Review.

SIR,—In your issue of November, 1885, I have read an article entitled "*A new use for Asbestos*." I have used asbestos for the past four or five years in my own print works here in the manner described, viz., for covering rods where exposed to steam, and have found it to answer the purpose very well. It never wears out, but becomes so soiled with color that it would stain our goods, and we are obliged to renew it on that account.

In the same issue of your paper, as well as in the January, 1886, number, attention is called to a material known as *mineral wool*, which you have described as an excellent non-conductor, and to this I beg to take exception. *Mineral wool* does not possess "excellent non-conducting qualities." I have had steam-pipes and a steam-boiler covered with it, and in the case of the boiler I did not find it to answer the purpose as well as *saw-dust* used in the same way.

A. B.

Our correspondent's opinion of the value of *mineral wool* as a non-conductor is strangely at variance with the opinions expressed in letters from engineers and others addressed to manufacturers of this material, and on which the articles in question were based.—[Ed.]

CORRESPONDENCE.—Continued.

SOCORRO, NEW MEXICO,
January 28th, 1886.

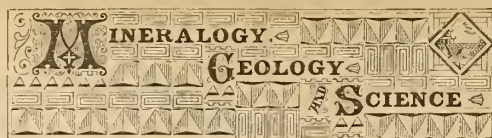
Editor Canadian Mining Review,
Ottawa, Canada.

Sir,—In reply to your remarks on the Canada Consolidated Gold Mine, in Hastings County, Ontario, as expressed in the issue of your paper for the present month, I beg to say that I have been well acquainted with this property; also the old "Dean & Williams," the "Fiegl," "Richardson" and several others in the townships of Marmora and Madoc, and know their ores as far back as 1875. Considering their favorable situation, in the midst of an agricultural and lumber country; the cheapness of labor, fuel and material; the large size and richness of the veins, and other advantages, nothing has been needed but good practical management and economy to make these properties productive and paying mines. In the case of the "Canada Consolidated," with a fine reduction plant and plenty of working capital, it should have always been a dividend-paying property instead of a drain on the pockets of the shareholders.

As there is nothing in the ore that requires more than careful milling, elaborate and costly machinery only serves to lose that which it is supposed to save, besides making the operation expensive. In 1876, in the "Fiegl" mill at Malone, I demonstrated the fact that ores from the old "Dean & Williams" and "Gatling" properties could be profitably worked. The "Fiegl" property, which had been considered worthless, I worked successfully for more than a year with an old rattle-trap mill with no other machinery than an engine and two cracked five-stamp batteries, with little or no capital at my disposal, and the ore was not as rich as that taken from the "Gatling" and "Dean & Williams" properties.

It is very evident, by your showing, that there must be loose and extravagant management where a vein with an average width of seven feet, yielding \$15 in gold and rich in arsenic, is not worked at a profit. The arsenic alone contained in the ore would yield a profit under intelligent and economical management, and in this far-away and expensive country such a property would be considered a *bonanza*. With the facilities and advantages enjoyed by miners in the district which I have already referred to, the gold ores of North Hastings can be treated at a cost not exceeding \$6 per ton.—

DONALD McRAE.



All correspondence under this head, and scientific exchanges, must be addressed to the Science Editor, Canadian Mining Review.

How Silicates rank in the Mineral Kingdom.

One very evident fact, the mere tyro in the study of nature cannot fail to observe, namely, the constant gradation and progression of more and more perfect beings in the immense scale of the Creator's works. Take for instance the animal world. At one end of the series, what do you meet? Organisms so imperfect as to call in question their right to be classed with living beings. In them all the organs are simplified and few in number. Nutrition, sensation and motion must in turn depend upon the same organs, for nature has refused them separate means of operation. One step higher and we report progress. The process of nutrition has its own organ, the body cavity; and even in the next higher class the body cavity is reserved to more general purposes, and the animal is supplied with a distinct alimentary canal. The student in zoology can pursue this ascension into the higher grades of animal creation, till he comes to a class clearly distinct from all its predecessors—the vertebrates. In these he finds a superior system of sensation, served by a most perfect nervous organization, and protected by that most admirable of all structures, the vertebrate skeleton. Now it is evident that a scientific classification is not a classification at all unless based upon nature. Such men as Cuvier could not have ignored this elementary maxim. They were too familiar with the ways of mother nature, not to fashion their system of classification in such a manner as to bring forth as much as possible the wonderful gradation just alluded to. Hence that admirable classification which enables the youngest student to take in at a glance the whole order of the animal creation; a classification which satisfies the more advanced student and is a sure guide to the original investigator who treads unaccompanied the new and immense fields of natural science.

Can Mineralogy boast of such perfection in its system of classification. At first sight we give it credit for extreme simplicity, but we are soon impressed by its most intricate complexity. Mineralogists have adopted two different methods of classifying minerals, both based nevertheless upon the same principle so that whatever is said of the one is sure to apply to the other. All minerals are immediately grouped according to one of the elements they contain. If the acidic element be chosen we have as many groups as there are negative elements. The entire kingdom is then subdivided into oxydes, chlorides, sulphates, carbonates, silicates, etc. If on the contrary we adopt the basic ingredient the number of positive elements determines the number of distinct groups; hence the calcium, the strontium, the Iron, the copper, the manganese groups, etc. etc. How different from the classification in zoology and botany! In Mineralogy there are no such divisions as sub-kingdoms, classes, orders or families. The kingdom is immediately subdivided into genera. As a natural consequence the continual gradation which we remarked in

the other system, is entirely absent. All these groups are on an equal footing. Whilst in the classification of animals, a superior class is found by adding to all the essential qualities of the inferior one, some new property which gives it its title to superiority; in Mineralogy no group borrows from another. Standing on the merits of their respective elements none of which has any right to lord it over another, each stands aloof single in its constitution, unsurpassed in its perfection without a superior or an inferior. All are equal, presenting in fact such a model as a nihilist or a communist might dream of for a democratic government.

But why complain? Is not this system the only one possible for minerals? Does it not come from nature itself? If so we must be silent, as all attempts to improve or correct nature must need prove abortive. Yet the defects of the system are painfully evident. Shall we lay them at nature's door? I say we ought not. The very fact that nature has suggested a completely different order in the other kingdoms strongly favors the presumption that she does likewise in the mineral kingdom.

But we are not trusting solely to presumptive argument. A cursory review of the mineral world will suffice to show that if the universal law of gradation is absent from the class of minerals, the fault is ours, not nature's. We should not forget that Chemistry and Mineralogy are inseparable and therefore that it is in the light of chemical principles that Mineralogy is to be studied.

The first class of mineral bodies which we meet in nature comprises the elementary bodies, consisting of atoms all of one kind. Simple in their constitution they are also remarkably similar in their mode of occurrence, and what is of still greater importance similar in this crystalline structure. One instance out of many will suffice to illustrate this observation. All the metallic elements which occur native, crystallize in cubes or octahedrons of the first system; with only three exceptions and these three: arsenic, antimony and bismuth, take the form of a rhombohedron which to all intents and purposes might be called a cube as its angles are very nearly right angles. Leaving aside the elements, we meet with minerals composed of two different elements. These are not only more complex in their constitution but they exhibit a greater variety in their crystalline forms and comprise classes of great importance owing to the number of minerals they contain and the many interesting laws both chemical and crystallographic to which they conform. The mere mention of oxydes and sulphides will suffice to call attention to the vast importance and decided superiority of this second group.

But we have not yet reached the summit of mineral perfection. Heretofore we have had none but minerals of a constant chemical composition; that is, minerals containing the same elements in the same proportions so long as the identity of the species is preserved. We now come to another class in which we find that perfect chemical constitution and perfect crystalline form, which are the two only perfections that minerals are acknowledged to possess. This is the class of the ternary compound substances in which chemical affinity, no longer restricted to two elements, asserts itself in the combination of two or more binary compounds. The most remarkable of this class are the carbon compounds and the silicates, both eminently characteristic of this third and highest group of mineral substances. Between these two groups the analogy is most striking. Their fundamental elements, carbon and silicon, are closely

THE ONTARIO GOLD MINING COMPANY.—This is the name under which an association has been formed and incorporated under the laws of the State of Michigan to carry on a general mining business in the United States, and starting with property located in Boulder county, Colorado, with the chief business office at Toronto, Canada, but with a branch office at Detroit. The directors are Alfred H. Page, president; James Patterson, vice-president; Clarence J. I. McCraig, secretary; Liscom R. Paige, general manager and treasurer; and Jas. S. Gavin, of Toronto and J. W. Fletcher, of Detroit. The capital stock is \$2,500,000 subdivided into 100,000 shares of the par value of \$25. Twenty thousand shares of stock have been placed in the treasury as the base of a working capital. The general manager, it is stated, has twelve years' experience in Arizona, California and Colorado.

Specimens of iron brought from Greenland, and hitherto assigned to meteoric origin, are now found to be part of the products of the country.

allied. Both have a high and varied equivalence, which is an essential condition for producing a multitude of compounds with each of the other elements. Both elements are abundantly distributed in nature. It is almost exclusively in these two series of compounds, namely, hydrocarbons and silicates, that we find that wonderful variety of chemical composition which corresponds to a single simple formula. In them, too, were first observed and afterwards perfectly established those laws of multiple proportion and replacement by mutual equivalence, which the great chemists of the latter part of this century have illustrated.

The narrow limits of this article must exclude many interesting observations that might be made upon the beauties of chemical formulas; the nice distinctions that determine the fixed boundary between bi-silicates, uni-silicates and sub-silicates; the greater perfection of crystallization in carbon and silicon compounds corresponding to greater perfection of chemical constitution, and those mysterious relations between chemistry and crystallography which they partly reveal and which very probably hold the key to the future science of mineralogy.

A cursory treatment of these very comprehensive questions would fail to do them justice, but the mere mention of them is sufficient to remind the specialist of their importance in connection with the subject of this paper. Enough has been said however, I presume, to convince the intelligent reader that the very constitution of the silicon and carbon compounds entitles them to a superior rank amongst inorganic beings. But if these two groups possess so many traits of similarity, they differ as regards the end for which they have been created. The carbon compounds being of organic origin constitute that numerous and continually increasing series which result from the union of chemical force with that other still more incomprehensible activity which is called life. The silicates, on the contrary, are almost entirely absent from organic bodies; and whilst carbon reigns supreme in every realm of life, silicon sways the sceptre in the purely mineral kingdom.

The more we study silicates, the more we are convinced that they are the minerals *par excellence*. We may be mistaken, but still we cherish the illusion. A great naturalist has said that in a certain sense the vertebrates alone deserve the name of animals, because in them solely are developed not only the essential character of animal life, but also that perfect organism which contributes so powerfully to the harmonious working of perception which is the specific property of animals. We would say that silicates alone deserve the name of minerals.

First, they have, with few exceptions, resisted the attempts which have been made to produce them by artificial methods. They are nature's own masterpiece, and she is reluctant to reveal the secret of their formation. Again, the ultimate perfection of the mineral is its crystalline structure. The more symmetrical its development, the more varied are the forms it assumes under one fixed and invariable law, and the more it approaches the ideal of a true mineral. Of course it is true that nearly all minerals show a crystalline form; and many, such as calcite, have it with a perfection and variety which is not surpassed by any silicate; but even calcite, when it becomes limestone, assumes such massive forms as to disguise its true crystalline beauty. Not so, as a rule, with silicates. Even when occurring in large dykes they preserve their crystalline structure, very imperfect sometimes, as might be expected, but asserting itself at the first opportunity in the crevices and cavities of the mass in the form of splendid little crystals,

which reveal all the geometrical beauty it had been forced to conceal.

Besides, the immense number of the silicates will always make it at least an awkward task to place divisions which include three or four species on a level with one which contains by far the majority of all the mineral species known. Nor can we ignore the important part played by the silicates in the inanimate world. What is that solid crust composed of, which, we believe, separates us from the ocean of fire which is ever rolling its huge waves beneath us? What substances have contributed most to the formation of those vast mountains which form the backbone and ribs of the continents? What material is that book of solid rock made of wherein the past history of our planet has been written by the hand of death? Silicates, yes silicates, the ubiquitous, all-enduring, grand old silicates.

It is among the silica compounds that with very few exceptions we find the gems, those marvels of the mineral world which astonish the scientific analyst still more than the proud possessor who wears them for their brilliancy and beauty.

One word more. In the animal world we divide all animals into vertebrates and non-vertebrates. All the invertebrates possess more or less of the properties peculiar to animal life; but the vertebrate adds to all other perfections that of its solid interior structure. In the same manner, in the mineral kingdom, elements either by themselves or by combination form all the various species which may be called non-silicates; but when silica enters into their constitution, combining with almost every element, it forms another and higher group of minerals, all of which contain that important factor called silica, and possess as a group such distinctive and important characteristics, that I have no hesitation, and trust my readers shall have none, in regarding them among minerals as vertebrates among animals—that is, as the highest sub-kingdom in the kingdom.

SCIENTIFIC NOTES.

Dr. J. Pelletan, writing in *La Nature*, has lately given to the scientific world a description of the Bertrand mineralogical microscope, just constructed in Paris. This instrument which is one of great accuracy is 23 inches in height. The tube does not draw out. The instrument can be moved quickly by means of a rack, and slowly by means of a screw, having a pitch of $\frac{1}{125}$ of an inch. On the head of this screw, is a division with an index estimating movements of $\frac{1}{2500}$ of an inch. In front of the tube is another rack, which moves a piece having an aperture for admitting a parallel passage of light, and one for holding an achromatic lens for convergent light. On the body of the instrument is a scale and a vernier, by which the thickness of specimens may be measured. The mirror is double—plane and concave—and may be given any position.

In the *Engineering and Mining Review* Prof. W. P. Blake describes a peculiar specimen of asphalt found in the Uintah Mountains, Utah. Its mineralogical properties are, "hardness, 2 to 2.5; gravity, 1.065 to 1.070; color, black, brilliant, and lustrous; streak and powder, a rich brown. It is a non-conductor of electricity, and is electrically excited by friction." It is easily fusible in the candle-flame, and burns with a brilliant flame. It is most readily dissolved in

the heavier and less volatile acids and fats, such as heavy, lubricating petroleum, warm oil of turpentine, etc. It is insoluble in ordinary alcohol. It is dissolved and becomes incorporated with melted wax, producing a mixture resembling "burnt wax" or ozokerite, with the latter of which this asphalt melts and unites. Prof. Blake says this kind of asphalt will probably be used in the arts, as a pigment, insulator and ingredient in lubricating, cereous and fatty mixtures.

Mr. Geo. F. Kunz, the writer of the above-mentioned article in the *Popular Science Monthly*, is also the author of a recent pamphlet on precious stones, being an abstract from the *Mineral Resources of the United States*. It is a very valuable and interesting brochure, as may be seen from the following quotations, regarding the diamonds of the United States: Early in 1855, a laborer in Manchester, Va., found a diamond in some earth he was digging. It was put into a furnace for melting iron, when it remained at red heat for two hours and twenty minutes, after which it was found uninjured, and brighter than ever. It was valued in Richmond at \$4,000. The cutting, which cost \$1,500, reduced the weight from $23\frac{3}{4}$ carats to $11\frac{1}{8}$ carats. Being an imperfect specimen, it is not worth more than \$400 to day. The first diamond found in North Carolina, was an octahedron, valued at \$100; another greenish in color, was found in 1852, in Lincoln Co.; another, a perfect crystal of white color was found in Mecklenburg Co. Other diamonds weighing from one-half a carat to over two carats are said to have been found in Burke Co.

In the current number of the *Popular Science Monthly* there is an interesting article by Geo. F. Kunz, on the famous Chalcedony Park or silicified forest, in Apache County, Arizona. This wonderful deposit consists of about a million tons of silicified trees, and covers a thousand acres. The writer supposes the manner of silicification to have been as follows: "The trees were overthrown, and covered with volcanic ashes and tufa; the heated silicified waters, either gushing from springs, or forced up by the violent volcanic action which felled the trees, percolated through the ashes, cooled on reaching the tree-level, and thus produced conditions favorable to silicification." The filtration through the tufa of waters from rains or springs would have assisted decomposition, and caused the silica to be set free. These waters, charged with silica in solution, penetrating into the cells of the wood, the cell-walls and fibres were replaced by jasper and agate, while transparent quartz filled the cells. The presence of oxides of iron and manganese in the waters of filtration produces a more rich and varied coloring in these silicified woods, than is found in these of any other part of the world. "The most remarkable feature of the park," says Mr. Kunz, "is the natural bridge of agatized wood, formed by a tree spanning a canyon forty-five feet in depth, and fifty-five in width. The tree is visible for a length of over one hundred feet. It averages three and a half feet in diameter, five feet at the thickest part, and three at the smallest." It is doubtful whether jade, jasper, or any of these ornamental stones have the richness of color, and the susceptibility of polish, which this agatized and jasperized wood possesses.

The November product of the great Venezuelan gold mine, *El Callao*, was \$211,458. The dividend for the month amounted to \$77,280, being 36½ per cent. of the product.

Proceedings of the Mineralogical Society for the Month of January.

The fifth annual meeting of the Mineralogical Society of the College of Ottawa was held on December 30th, 1885, when the election of officers took place, and the objects and prospects of the Society were discussed.

On January 5th, 1886, the regular work was resumed. Rev. Father Marsan, O.M.I., read a paper on "Silicates and their place in the mineral kingdom," in which he advocated the quite novel proposition that the silicates should be considered as a sub-kingdom. He treated the subject in a masterly manner, and in the discussion which followed disposed of the principal objections which were brought forward. Mr. W. Herckenrath read a paper on the "Mineralogy of Pliny," showing the great strides in advance made by the science since Pliny's time. Mr. D. A. Campbell gave a series of experiments illustrating the coloration of flame. Prof. Macoun, who was present at this meeting, highly praised the objects of the society and laid special stress on the importance of acquiring a knowledge of sciences by practical experiments such as he had witnessed.

On January 13th Mr. Wade Smith read an interesting paper on "sponges," and showed that though apparently quite foreign to mineralogy, they had in reality a close relation with that science. Rev. Bro. Maloney read a paper on the "Twelve Stones of the Essau." By the novel way in which he treated it he made a comparatively dry subject very interesting. Mr. C. C. Delaney followed with experiments showing the action of acids on limestone.

On February 13th Bro. Maloney continued his paper on the "Twelve Stones of the Essen." Mr. D. Phalen successfully performed several experiments illustrating the methods of testing for metals in solution. Rev. Prof. Marsan read an essay on the "lustre of minerals," which elicited an animated discussion.

BOOK NOTICES.

PRACTICAL AND ANALYTICAL CHEMISTRY: A complete course in Chemical Analysis. By Henry Trimble, Ph.G., Professor of Analytical Chemistry in the Philadelphia College of Pharmacy. P. Blakiston, Son & Co., Philadelphia.

This book supplies a want which has long been felt in institutions, where but a limited time can be devoted to the study of analytical chemistry. Most treatises on this subject are too comprehensive for an elementary course; and the result in many instances has been the elimination of analytical chemistry from the programmes of classical courses. Such a step is certainly to be regretted, as chemistry cannot be properly understood, nor students interested in it, when the subject is presented in its least practical aspect. A work was needed, elementary, yet sufficiently complete to give an exact notion of the science, and to enable the student to pursue afterward, if he so desired, a higher course of qualitative and quantitative analysis. This end has been secured by the present publication, which gives due prominence to every fundamental operation, and the most important confirmatory reactions. The whole work is written in a clear and concise style; tables are most conveniently placed at the end of each chapter, and the clear and beautiful type, distinct headings and neat illustrations, make it a very attractive text-book.

Practical Treatise on Hydraulic Mining in California, with Description of the Use and Construction of Ditches, Flumes, Wrought Iron Pipes and Dams; Flow of water on heavy grades and its Applicability, under high-pressure, to mining; by AEG. J. BOWIE, JR., Mining Engineer, New York; D. VAN NOSTRAND, 23 Murray street, 1885. pp. 313.

This handsomely printed and thoroughly illustrated work meets a want in an adequate manner and we welcome its publication. As a reference both for superintendents and engineers in charge of or undertaking hydraulic mining enterprises, it can but prove invaluable; supplying as it does, information based on the results of experience under almost every possible emergency in mining engineering, coupled with descriptions of the various mechanical appliances requisite under every possible condition. The tables which Mr. Bowie furnishes give the dimensions and cost of all the notable ditches and flumes in California; area and weight of wrought iron pipes generally employed; flow of water through pipes, with a mass of statistics regarding the operations of well known hydraulic mining operations.

The Determination of Rock-Forming Minerals by DR. EGGEN HESSACK, Private Dozent in the University of Graz; translated by EUSTAS G. SMITH, Ph.D. Professor of Chemistry and Mineralogy of Beloit College, Wisconsin. New York: John Wiley and Sons, 1886.

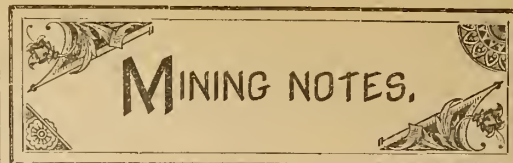
This manual designed especially for the use of students, places before English readers a description of the optical and other physical properties of minerals in a condensed, yet exhaustive manner not found elsewhere, with the methods of investigation and rock-forming minerals; there is also given a copious table of the bibliography of the subject as well as explanation of the numerous cuts. This work may be had through the business office of the *Financial and Mining Record*, New York.

The Manufacture of Magnesium.—The problem of producing the semi-precious metals at a low price is now very actively considered in France, and in this direction small works for making magnesium have been established at Corbell. The most suitable lamp for burning wire of this metal is now the subject of investigation.

The Poetsch System.—The Poetsch system of freezing a water-bearing stratum for the purpose of sinking through it is to be applied in France to a shaft that has collapsed. This undertaking will be a peculiarly difficult one, and the result will be awaited with interest in all mining circles.

Russian Manganese Mines.—The Manganese mines of the Charapau District, 26 miles from the nearest railroad station, at Kwirila, Southern Russia, are growing in importance. In 1884, the output was 12,050 tons, and it is expected that during 1885 it will increase to 27,550 tons, of which 16,400 tons will be shipped from Batoum, and 11,150 tons from Poti. The bulk of the ore goes to England.

A productive Australian Gold Quartz District.—Charters Towers of Queensland, since the opening of its mines in 1872, has been steadily increasing in the yearly value of its quartz, crushing from 20,064 ounces of gold that year to 103,429 ounces for 1884, the value per ton of quartz crushed having been singularly uniform or about 1 ounce 13 dwts. 11 grains per ton.



NOVA SCOTIA.

Work at the Mount Uniacke mines progresses satisfactorily. The quartz carries gold in paying quantities, and a large amount of it can be mined at comparatively small cost from several lodes in the slate belt.

A good quality of fire-clay has been discovered at New Ross, also a manganese deposit of some extent. The distance from shipping point will, however, be a drawback to profitable mining.

Further work in the north cross-cut from the 150-foot level of the Coxheath copper mine has proved the existence of an additional vein four to five feet thick, the ore of which averages about 8 per cent copper.

During the year 1885 the Springhill mines raised 375,000 tons of coal. This is the largest output yet reached by any Nova Scotian mine, and it is anticipated that next year these figures will be greatly exceeded.

The Acadia and Vale Coal Companies of Pictou County have had meetings of their shareholders to complete the consolidation of all the companies operating in that district under one management.

The manganese deposit at Walton, owned by Messrs. Churchill, has proved to be more extensive than there was reason to expect. Some additional pockets have been met with which will doubtless yield a large quantity of high grade ore.

An unusually rich vein of gold-bearing quartz has recently been discovered on a property owned by Mr. C. B. Hilchey and others at Tangier, and the vein is now being thoroughly tested. Some of the quartz carries from 10 to 12 ounces of gold per ton, and it is expected the vein yield will be much above the average.

The exports of minerals from the province for the past two years have been, as nearly as can be at present estimated, as follows:

	1884.	1885.
Coal (sales) ..	1,261,650 tons	1,250,000 tons
Gold	16,069 oz.	20,000 oz.
Iron ore	54,885 tons	50,000 tons
Gypsum	111,068 "	90,000 "
Manganese	302 "	250 "
Antimony	600 "	800 "
Limestone	25,567 "	24,500 "
Building stone ..	780 "	800 "

MOOSE RIVER.—Twenty-five men are now mining in this district, most of whom are tributaries. The principal work is being done on what is known as the Little North Lead. The crushing material is composed of slate and small quartz, the thickness varying from 8 to 15 inches, and the yield 6 to 15 dwts. per ton. The new lead which was discovered last November is being worked by Mr. Toquoy with five men. Eighteen tons of quartz from this lead have been put through the crusher, yielding 17 ounces of gold. The ten-stamp mill, which is run by water power, is kept busy night and day, and even with this it is found difficult to crush all the quartz that is being taken out.—*Critic.*

The past year's production of gold in the province shows an increase over that of 1884, the output being estimated, approximately, at 20,000 ounces, as against 16,060 ounces for the preceding year.

The gradual but steady growth of the coal sales in Nova Scotia may be represented by decades of years as follows:

Years.	Tons.
1791—1800	51,048
1801—1810	70,452
1811—1820	91,527
1821—1830	140,820
1831—1840	839,981
1841—1850	1,533,718
1851—1860	2,399,819
1861—1870	4,927,319
1871—1880	7,377,428
1881—1885 (5 years)	6,094,366

NEW BRUNSWICK.

A deposit of *stibnite*, carrying sixty per cent. of *antimony*, has been discovered in Albert county, and miners will be at work on it in the spring to test its extent.

Discoveries of rich deposits of *manganese* have been made during the past few months in several localities in the province, and it is expected there will be a large production of this mineral during next summer.

It is probable that mining operations will be resumed in the spring at the manganese mine at Hopewell, Albert county. The mine has been inspected by a competent mining engineer, who has pronounced it capable of yielding a large annual output under intelligent and efficient management.

QUEBEC.

The Anglo-Canadian Asbestos Company are proceeding with active operations at their mine at Black Lake, and will not, hereafter, suspend work during the winter months as has been the custom.

The *Villeneuve* mica mine in the township of the same name, Ottawa county, is yielding a steady output of very fine mica. The mine is now fairly opened and is capable of producing a large annual supply.

Dr. James Reed has purchased the South Ham mines, Lake Nicolet, Wolfe county. This property includes asbestos, antimony, copper, iron and chromic iron deposits, and embraces an area of 2,000 acres.

The phosphate mines in the du Lièvre district and in Templeton are giving employment to a large force of miners and laborers, and ore is being brought to the surface in great abundance. The mines were never so productive as at the present time.

Good work has been accomplished during the past few months by the St. Onge Gold Mining Company at their mine on Slate Creek, Beauce. The drift from the bottom of the shaft is now in ground that carries coarse gold in paying quantity and is some feet above bed-rock. This company's prospects are very bright.

ONTARIO

Phosphate mining in the Kingston and Perth districts has not been engaged in during the past two years as actively as formerly; the attention of miners having been attracted to the larger deposits in the county of Ottawa.

The only mica mine now being worked in this province, that we know of, is near Sydenham, in the township of Loughborough, county of Addington. The mica is dark amber in color and is produced in quantity.

A new mining company composed of Toronto, London, Ont., and United States capitalists is being organized for the purpose of purchasing mining options on claims in the Thunder Bay district, and placing them on the market.

Ontario has sent to the Colonial and Indian Exhibition the largest and best exhibit and the greatest variety of iron ores that will be forwarded by any other province of the Dominion. It would be difficult to collect a better display of iron ores from any part of the world.

(Thunder Bay District.)

Some good silver ore has been taken from the *Porcupine* mine, and we hear that *Silver Creek* mine is producing a quantity of native and black silver.

The proposed line of the Lake Superior Mineral Railway runs through the silver district passing close to all the working mines on its way to the Huronian mine in the gold region.

The Beaver and Rabbit Mountain companies have given contracts for the erection of mills at their respective mines. It is expected that the mill will be in operation at the *Beaver* by the 1st July next.

The vein of the *Rabbit Mountain* is said to be dipping, with a strong incline, under the *Rabbit Mountain Junior* property, while the vein of the latter dips towards the former property. It is a question which will carry the other when the two veins meet.

Within twenty-five miles of Port Arthur there are five working silver mines, viz.: the *Rabbit Mountain*, *Beaver*, *Silver Creek*, *Twin City* and *Rabbit Mountain Junior*. They are within three miles of each other and are connected with Port Arthur by wagon and winter sleigh roads.

Gold and silver were discovered last summer on the east shore of Lake Nepigon. A winter road has been made from Nepigon Station on the line of the C. P. R., a distance of 15 miles, to the location, and miners are now at work proving the discoveries. A car load of ore will be shipped to New York for a practical mill test.

BRITISH COLUMBIA.

About four tons of quartz from Ireland mountain, Cariboo district, have been crushed and found to yield \$20 per ton.

The total exports of gold from the province for the year 1885 amounted to \$594,782.52 as reported by Wells, Fargo & Co.

It is expected there will be considerable squabbling over claims on Granite Creek and tributaries in the spring if they should prove valuable, as no doubt many are held illegally.

Work was shut down on Granite Creek towards the end of November. Extensive preparations have been going on during the winter for spring work, which will be resumed about the end of the present month and continued until the June or July freshets set in. When the water again subsides there will be no interruption for the balance of the year.

If capital were forthcoming to develop the quartz ledges which exist in Kootenay district there is little doubt as to the result, the richness of these ledges being well known.

The Quesnelle Quartz Mining Company are doing good work in Cariboo. They have twenty men employed, including an expert and many practical quartz miners.

The total yield of the Cariboo district for the year 1885 is in the neighborhood of \$350,000. It has been said by some that Cariboo is played out. Others, however, are of opinion that it has not yet seen its palmiest days.

Upwards of \$100,000 worth of gold has been accounted for as having been taken from Granite Creek the past season. There are now wintered in the district about 800 white miners and 300 to 400 Chinamen, and there is no poverty among them.

At Lorne Creek authentic reports show that the yield for 1885 has been considerably less than for the previous year. Gold mining was first started in 1884 on Lorne Creek, which is a tributary to the Skeena River, and the gold taken out of it is valued at \$17 per ounce.

Fresh discoveries have been made on what is known as the South Fork of Granite Creek and in some smaller creeks. Champion Creek is also a recent discovery, emptying into the Talaquen river, about twenty miles above the mouth of Granite Creek. Several claims have been located on it and the prospects for gold are very promising.

The following is the total output of coal from the Wellington and Vancouver mines for the year 1885:

Wellington mines (tons)	220,000
Vancouver " "	137,548
	357,548

These two mines furnish employment for over a thousand men.

UNITED STATES.

The production of copper in the United States in 1885 reached about 155,000,000 pounds of fine copper, as against 145,000,000 pounds in 1884.

The product of copper ingot from the Calumet and Hecla mine from 1875 to 1883, both years inclusive, was not more than 4.80 per cent. of the ore mined.

A short time ago a shaft was sunk to a depth of 1,100 feet in Livingston County, N.Y., when a vein of pure rock salt was struck 18 feet in thickness. The salt produced from the seam is 99.37 per cent. of rich chloride of sodium.

The gold bullion produced by the mines of the Plymouth Consolidated Gold Mining Company, California, for the year 1885, was \$880,527.44; operating expenses amounted to \$319,750.91, leaving a profit of \$560,776.53.

It is now an established fact that the Calumet and Hecla Copper Company is to have smelting works at Lake Linden. The new works will be erected by the Detroit and Lake Superior Copper Company, for the smelting of Calumet mineral.

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Welland Canal Enlargement.

Notice to Contractors.

SEALED TENDERS addressed to the undersigned, and endorsed "Tender for the Welland Canal," will be received at this Office, from mechanical, skilled practical contractors, until the arrival of the Eastern and Western mails on TUESDAY, the NINTH day of MARCH next, for raising the walls of the locks, weirs, &c., and increasing the height of the banks of that part of the Welland Canal between Port Dalhousie and Thorold.

The works throughout will be given in sections.

A map showing the different places together with plans and descriptive specifications, can be seen at this office on and after Tuesday, the 23rd February instant, where printed forms of tender can be obtained. A like class of information relative to the works will be supplied at the Resident Engineer's Office, Thorold.

Parties tendering are requested to examine the locality and bear in mind that the season and circumstances under which the works have to be done, render some of them of an exceptional nature.

Tenders will not be considered unless made strictly in accordance with printed forms and, in the case of firms, except there are attached the actual signatures, the nature of the occupation, and place of residence of each member of the same; and further a bank deposit receipt for the sum of Two Thousand Dollars or more—according to the extent of the work on the section—must accompany the respective tenders, which sum shall be forfeited if the party tendering declines entering into a contract for the works at the rates or prices stated in the offer submitted. The amount required in each case will be stated on the form of tender.

The deposit receipts thus sent in will be returned to the respective parties whose tenders are not accepted.

This Department does not however, bind itself to accept the lowest or any tender.

By order
A. P. BRADLEY,
Secretary.

Dept. of Railways & Canals,
Ottawa, 17th Feb., 1886.

NEW MAP —OF THE— OTTAWA PHOSPHATE REGION.

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Dwelling-house, Barns, Stables and Out-houses, in good order, on the property, in proximity to a good phosphate opening from which several tons of high-grade phosphate have been raised, and where mining operations can be at once started.

The property has been partially prospected and several promising out-croppings of phosphate have been exposed. It has been pronounced a valuable phosphate location by miners working in the vicinity, and satisfactory reasons can be given for offering it for sale.

The owners, Messrs. Pearson, who hold a clear title to the lots, will sell them in fee simple, or the mining rights only.

Cost of transportation from the property to point of shipment will not exceed \$2 per ton.

For terms and full information apply on the premises, or to

THE POSTMASTER,
East Templeton, Pro. Que., Canada.



Notice to Contractors.

SEALED TENDERS addressed to the undersigned, and endorsed "Tenders for Ice, Public Buildings," will be received at this office until Thursday, the 24th of February next for supplying the ice required during the season of 1886 for the Public Buildings, Ottawa.

Sealed tenders, endorsed "Tenders for Ice, Government House, &c.," will also be received at the same time for filling the ice house at the Rideau Canal Basin, Ottawa, and that at Government House.

Tenders to state price per block of the following dimensions, viz:—3ft. by 1ft. by 1ft., which price must include cost of packing and of the saw-dust required for that purpose.

The ice to be measured before being packed in the ice house and payment to be made accordingly.

N. B.—The ice must be taken from the Ottawa River, above the Chaudiere Falls.

By order,
A. GOBEL,
Secretary.

Department of Public Works,
Ottawa, 20th Jan., 1886.



GRAND COLONIAL

Exhibition in London, Eng.
1886.

FIFTY-FOUR THOUSAND FEET RESERVED
FOR CANADA.

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THE Colonial and Indian Exhibition to be held in London, England, commencing May 1st, 1886, is intended to be on a scale of great magnitude, having for object to mark an epoch in the relations of the parts of the British Empire with each other.

In order to give becoming significance to the event, a Royal Commission is issued for the holding of this Exhibition, for the first time since 1862; and His Royal Highness the Prince of Wales has been appointed President by Her Majesty.

The very large space of 14,000 square feet has been allotted to the Dominion of Canada by command of the President, His Royal Highness.

This Exhibition is to be purely Colonial and Indian, and no competition from the United Kingdom or from foreign nations will be permitted, the object being to exhibit to the world at large what the Colonies can do.

The grandest opportunity ever offered to Canada is thus afforded to show the distinguished place she occupies, by the progress she has made in Agriculture, in Horticulture, in the Industrial and Fine Arts, in the Manufacturing Industries, in the Newest Improvements in Manufacturing Machinery and Implements, in Public Works by Models and Designs; also in an adequate display of her vast resources in the Fisheries and in Forest and Mineral wealth, and also in Shipping.

All Canadians of all parties and classes are invited to come forward and vie with each other in endeavoring on this great occasion to put Canada in her true place as the premier colony of the British Empire, and to establish her proper position before the world.

Every farmer, every producer, and every manufacturer, his inures in assisting, it having been already demonstrated that the extension of trade always follows such efforts.

By order,
JOHN LOWE,
Sec. of the Dept. of Agriculture.
Ottawa, 1st Sept., 1885

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CANADIAN MINING REVIEW

VOL. 4.—No. 3.

1886—OTTAWA, MARCH—1886

VOL. 4.—No. 3

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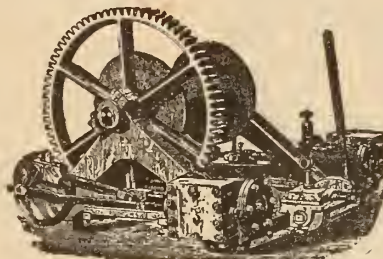
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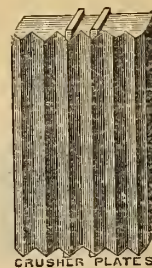
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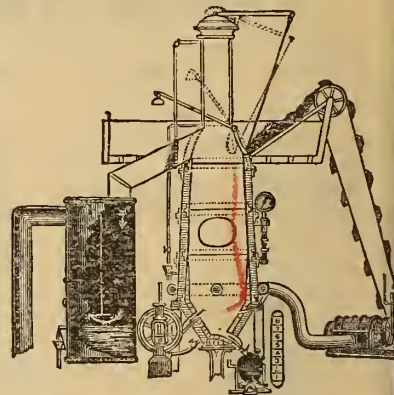
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Plans and specification can be seen at the Department of Public Works, Ottawa, at the office of Messrs. Durand & Moore, Architects, London, Ont., on and after Monday, 15th proximo.

Persons tendering are notified that tenders will not be considered unless made on printed forms supplied, and signed with actual signatures.

Each tender must be accompanied by an accepted bank cheque, made payable to the order of the Honourable the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party declines to enter into a contract when called upon to do so, or if he fails to complete the work contracted for. If a tender is not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order, **A. GOBEIL, Secretary**

Department of Public Works,
Ottawa, 24th Feb., 1886.

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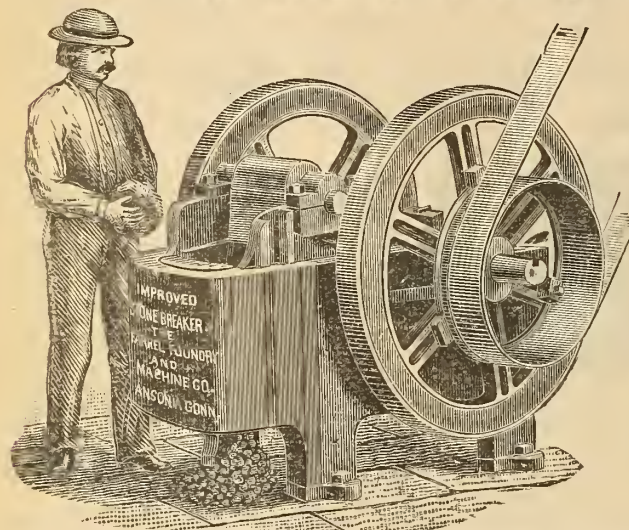
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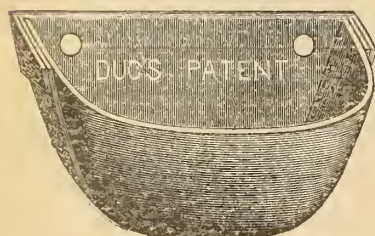
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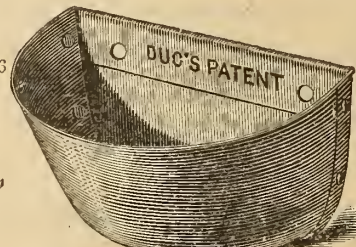
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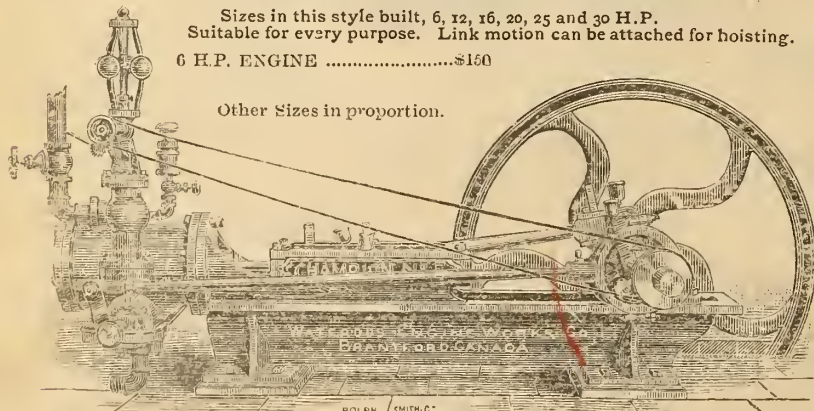
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The CANADIAN MINING REVIEW is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts as well as others interested in Canadian Mineral Lands are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 20th of the month.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

Early in the present month an influential deputation, composed of representative men, waited on the Minister of the Interior to call his attention to the dissatisfaction that prevails among those who are interested in mining in Canada by reason of the past indifference of the Geological Survey to the collection of statistics and information connected with our mines and minerals, and urged upon him the importance and necessity of establishing a Bureau of Mines in connection with the Survey. A short account of what was said and done by the deputation is reported in another column, and it will be seen by reference to the list of names that the gentlemen who have taken up the subject are for the most part members of Parliament representing constituencies largely interested in mining, and all of them, twenty in number, are directly or indirectly interested in the development of Canada's mining industries. This is not the first time that the central government has been requested to establish a Bureau of Mines and Mineral Statistics, nor is it the first time that its attention has been called to the lack of some such means of collecting and classifying facts as to the sites and yield of our economic minerals. What is desirable is a complete series of statistics relating to the minerals of the Dominion, issued at regular intervals and corrected and enlarged as new information is obtained. It is worthy of note that at the meeting in Montreal in 1884 of the British Association, the President stated

that the collection of statistics was of very great importance, and he thought it would be a good thing if the Canadian Government would take the matter into their serious consideration and find a way to the establishment of a Bureau for the purpose.

MR. CLEMENT Le NEVE FOSTER, of Wales, at the meeting of the British Association above referred to, said that the system in vogue in England for the collection of mineral statistics was the result of a meeting of that Association, and he considered that their visit to Canada will not have been thrown away if the only outcome of it is to be the establishment of a system for the collection of statistics of the mining interests throughout the Dominion. He suggested that a similar system to that in England might be adopted by the Canadian Government, and stated that at the last meeting of the inspectors of mines, in England, a table of the mineral statistics of the British Colonies was compiled for the Home Office, and great difficulty was experienced in collecting any statistics of the Canadian minerals.

Surely it is right that a country with so much wealth of the mine such as Canada possesses should have a proper system for the collection of its mineral statistics, and it is fervently hoped that a suggestion on that head, coming with all the weight of the economic section of the British Association, shall not have been made in vain. Any suggestion supported by such authority should not be without its influence on our central government, and now that this need has received the confirmation of the representatives of our mining communities, and has been brought by them so forcibly to the notice of the Minister of the Interior, it is expected that through him it will receive the early attention of the Government, and that a Bureau of Mines and Mineral Statistics will shortly be announced as a recognized and permanent feature of the Geological Survey of Canada.

Some weeks ago there appeared in one of the leading Ontario morning papers the following paragraph, which should be of especial interest to the mining community:

"WHY PROF. SELWYN IS DISLIKED."

"Professor Selwyn, in charge of the Geological Museum, will leave on Tuesday next for England to make preliminary arrangements for Canada's geological exhibit. From what can be learned from reports made against Prof. Selwyn, it would appear they have been prompted by those who, having personal interests to serve, were thwarted by this officer. During the coming session of Parliament some startling revelations are likely to be made, in which it will be shown that several individuals occupying seats in the House of Commons have endeavoured to tempt Prof. Selwyn with bribes to report favorably on mineral properties they held, and which they wished to develop. Hence the attacks on the Professor."

This appears to have been inspired on good authority and has not been contradicted. It is a serious charge, insidiously and vindictively made, and the paragraph has probably escaped the notice of those who would be most interested in reading it.

In our last issue, referring to the cause of the strike at the Springhill coal mines, Nova Scotia, it was put down as owing to the unsafe condition of part of the workings. We are informed that this was not the case, but that the trouble arose through the alleged harder quality of the coal in certain working places. These mines have hitherto been noted for the care and attention given to the safety of the workmen, a praiseworthy character, which has been frequently commented on by visitors, and notably on the occasion of a visit recently paid to them by an English Inspector of mines, who remarked that the occupation of mine inspectors would be dispensed with if all English mines were conducted with equal care.

Elsewhere we give a short account of what transpired at the meeting in Hull, called for the purpose of pressing the Gatineau Valley Railway Company to resume the work of construction and to push it vigorously with a view to the early completion of the road. If the President's promises and assurances are to be realized it will be necessary that the Quebec Government proceed at once to locate the land grant, on which, according to Mr. Mackintosh's statements, depends the consummation of his negotiations for the building of the road. The Gatineau Valley Railway would be an important factor in opening up and stimulating great mining industries in the county of Ottawa, and we earnestly hope that the Government will, so far as it lies within their power, remove every obstacle that serves as an excuse for the incompletion of the road.

The advisability of grinding Canadian phosphate rock and shipping it in a pulverized state has for some time occupied the attention of mine owners, and the experiment is about to be put to a practical test by the Portland, P.Q., Phosphate Mining and Milling Company. This company have erected and furnished a mill at the Basin du Lièvre, near Buckingham, and will grind and ship a large quantity of phosphate during the coming season. The mill is very conveniently situated for shipping as regards railway and water communication, and the water power for driving purposes is unlimited. The Portland, P.Q. M. & M. Co. have everything in their favour, and if this branch of our phosphate industry is practicable from a commercial point of view, and can be profitably carried on under any circumstances, their enterprise should and no doubt will be rewarded by successful results.

If this first attempt to establish a separate branch to our phosphate industry proves a success it will give an impetus to mining in the district and will be an incentive to others to erect mills for crushing and grinding phosphate rock. We are not informed as to what description of mill the Portland company has procured, but we have seen samples of the rock it has ground to an impalpable powder, from which we judge

that it does good work. Our attention has been directed recently to the many advantages the "Sturtevant" mill possesses for this particular class of work. It has been designed for crushing and grinding phosphate, emery and all hard and refractory ores, and practical mill superintendents who have used it on all descriptions of ores have attested to its unquestionable merits. The "Sturtevant" is a crusher and stamp-mill combined, and it is of extremely simple construction. It is arranged to grind to any fineness desired, from one and one-half inch mesh to an *impalpable powder*, and is so compact in its construction that it occupies less space than any other mill we know of having the same capacity. It is a powerful, efficient and durable machine, and can be operated with great economy, which, in addition to its simplicity, execution and capacity, should recommend it to people who are engaged in crushing and grinding ores. We would advise those who contemplate engaging in grinding phosphate to examine the "Sturtevant" mill, as we deem it a very suitable machine for this purpose.

We are indebted to Mr. Chas. W. Willimott, Curator of the Geological Museum, for a copy of his paper on the *Minerals of the Ottawa District*, read before the Ottawa Field Naturalists' club. In dealing with this interesting subject, Mr. Willimott confines himself to the three neighbouring townships, Templeton, Hull and Wakefield, as his own observations had extended only over that portion of the county of Ottawa. He enumerates the various minerals that occur within that area, and gives an intelligent, general outline of the more important characters of each, dwelling more particularly on the features of the deposits of Apatite, Iron and Graphite. Mr. Willimott informs us that about sixty minerals are known to occur in the three townships referred to, many of which are unrivalled in the Dominion, and adds that it is doubtful if the same extent of country elsewhere in Canada can claim one-half that number.

THE PHOSPHATE TRADE.

There is no disposition on the part of mine owners to check the output of their mines—on the contrary, they are working their properties to their utmost capacity, and many thousands of tons of ore are now awaiting transportation. The present appearance of the mines and the activity which has characterized operations since the close of the shipping season of 1885 justifies us in predicting, as we did in our last month's issue, that the quantity of phosphate that will go forward this year will be several thousand tons in excess of the shipments of any former year since this industry was inaugurated in Canada. The accumulation of ore at the various mines also indicates that this will be the case, and close inspection of the contents of the orebins leads to the conviction that this year's shipments will be of superior grade, and will average, as they did for 1885, over 80 per cent. Careful dressing of the ore is a

sine qua non to the success of Canadian phosphate mining, and mine owners having learned by experience how necessary such precaution is, if they wish to obtain high prices for their output, it is not likely they will retrograde and become careless on this essential point.

The principal contributors to the general output of Ottawa county for this year will be The Phosphate of Lime company, the Union Phosphate company, the Dominion Phosphate company, the Ottawa Phosphate company, W. A. Allan, Ottawa, the Du Lièvre River Phosphate company, the Glasgow-Canadian Phosphate company, and Messrs. McLaren & Blackburn. Of these it is not improbable that the Dominion Phosphate company will be the heaviest producers, while all the others will undoubtedly send forward large shipments. Another powerful corporation, the Anglo-Canadian Phosphate Company, will engage in active operations in Ottawa county and in the Perth district early in the spring, and will help to swell the general output. This company has been recently organized in England under most favourable auspices, and will henceforth engage extensively in phosphate mining in Canada. Every day, we might say, brings us fresh evidence of the expansion of this important industry, and a few remarks from us on

THE FUTURE OF CANADIAN PHOSPHATE

may interest our readers.

When Canadian phosphate first entered the English market, it encountered much disfavor and some serious objections. Its hardness made it difficult to grind; the fluorine that it contained gave out offensive odors and injured the workmen's throats; after being made soluble by sulphuric acid it became partially insoluble again, or in technical phrase "went back;" in fact every manufacturer had his pet grievance against it, and for some years it was difficult of sale. Its high quality and comparative cheapness after awhile enforced attention, and the assurance of steady supplies, owing to enlarged working and the low rates of freight obtainable by vessels that required ballast under their deal cargoes, made it an object for manufacturers to overcome the difficulties connected with its use. The result is that although the shipments for the past year were the largest ever known, a month after the season had closed there was not a ton of Canadian phosphate to be had in England in answer to the demands of buyers, the whole having gone at once into the hands of consumers. The largest manufacturer in England states that he now uses as much Canadian as Carolina rock. He not only uses it largely with Belgian and other low grade phosphates to serve as an enricher, but he makes a high class superphosphate from Canadian rock alone. His chemist is said to have a "wrinkle" by which he gets better results than some others obtain and his success leads to further experiment.

In Germany Canadian phosphate has likewise been winning its way and all the 80 per cent. phosphate that Canada can produce with the present facilities can be readily sold in that market.

In spite of the favor it has gained, prices are exceptionally low; this is partly due to the competition of Curacao and Aruba phosphates from the West Indies, but chiefly is owing to the intense agricultural depression that now prevails. Much land has been thrown out of

cultivation and many farmers are too poor or too discouraged to buy fertilizers. This leads the numerous manure manufacturers into sharp competition to dispose of their products; the prices they sell at leave no profit and their efforts become intensified in the direction of cheapening the raw material. It is, however, significant that the Chemical Manure Manufacturers' Association, which is a combination of all the leading manure makers in Great Britain, at its annual meeting proposed combined action, not to buy cheaper, but "to keep phosphates at their present low level," showing that in their opinion bottom prices for raw material had been reached.

In Europe Canadian phosphate must always meet with strong competition, but there is a hitherto neglected field where it is destined to reign without a rival. The report of the National Fertilizer Association of the United States shows that over a million tons of fertilizers were made in the United States in the past year and that the output is increasing at the rate of 100,000 tons per annum. About three-fourths of the whole was used in the States adjoining the Carolina phosphate beds, while but little was used in the extreme Northern States, although the lands there equally demand it, and almost none was used in Canada in spite of the utter impoverishment of the once prolific wheat fields of Quebec. As knowledge of scientific farming extends, artificial fertilizers will be largely used in these sections and Canadian phosphate is the natural source of supply. By the return grain vessels from Kingston phosphate can be sent through the great lakes to the northern cities of the United States for a freight of \$1.50 to \$2 per ton, whereas the Carolina phosphate must pay \$5 to \$6 per ton by rail to these points, besides which the Carolina contains only about 55 per cent. of phosphate of lime as against 80 per cent. in Canadian phosphate.

The establishment of fertilizer works in Canada and the Northern States will doubtless be speedily accomplished, and a large market must open for Canadian phosphate in addition to the expanding demand in Europe. These facts and considerations show that a good future awaits this industry, and as the output of Carolina phosphate has grown from 20,000 tons in 1870 to over 430,000 tons in 1885 with an ever widening market, so we may expect a similar increase in the output of Canadian phosphate.

Phosphate Quotations.

The most recent advices from abroad report the phosphate market sluggish, although 1s. $\frac{1}{2}$ d. is freely offered for future delivery for 80 per cent, with *one fifth of a penny rise*. The present condition of the phosphate market is owing to the depression in all branches of trade, but it is expected to be more buoyant after the opening of navigation, and when shipments begin to arrive at Liverpool, London and European ports.

Large Phosphate Contracts.

Two weeks ago we reported sales of Canadian phosphate for spring shipment, and we have now to note contracts to the extent of 8,000 tons for shipment at this port (Montreal) during the coming season. It is understood that these large contracts have been made by the Dominion Phosphate Company, through Messrs. Lomer, Rohr, & Co., mostly for Continental ports. The prices are strictly private, but it is believed that the sales of Canadian apatite mentioned in the *Trade Bulletin* of March 5th had reference

to a portion of the above contracts, which was on a basis of 13½d per unit with a fifth of a penny rise for 80 per cent. rock delivered at Hamburg. The shipments of the above phosphate company last year were about 3,000 tons, so that the output this year will show a remarkable increase in one mining company alone.—*Trade Bulletin.*

Anglo-Canadian Phosphate Company, (Limited).

We are pleased to announce the organization of this corporation and to acknowledge the receipt of the company's prospectus. The Anglo-Canadian Phosphate Company has been formed for the purpose of consolidating Captain R. C. Adams' interests in phosphate lands in the Perth district, with those of some Englishmen owning phosphate locations in the same neighbourhood, and the entire interests of the Lièvre River Land and Phosphate Company, whose properties lie in the Lièvre district of the county of Ottawa. The company has been incorporated under the Companies Acts of Great Britain, 1862 to 1883, with a capital of £65,000 (about \$325,000), in 6,500 shares of £10 each, and is composed of wealthy and influential English capitalists and merchants of Montreal, as follows:—

Directors.

SIR JOHN MORRIS, Wolverhampton.
JOSEPH THOMPSON, Esq., Manchester.
WILLIAM CROSFIELD, Esq., Liverpool.
P. MOIR CRANE, Esq., Manchester.
R. A. JOB, Esq., Liverpool.
W. T. COSTIGAN, Esq., Montreal.
CAPT. ROBERT C. ADAMS, Montreal.

Bankers.

THE CITY BANK, London, E.C.,

Solicitors.

Messrs. LAYTON & STEEL, Liverpool.

Auditors.

Messrs. LEWIS & MOUNSEY, Liverpool.

Secretary and Agent in England.

BRAINERD RADCLIFFE, Esq., Liverpool.

Offices.

3 Chapel Street, Liverpool.

Much credit is due to Captain Adams who has been most active in organizing this powerful company. He has been one of Canada's most enterprising phosphate miners for the past ten years, and although he has been deservedly successful since he first engaged in the industry he has always been of the opinion that operations conducted on a large scale would be more profitable. The Anglo-Canadian company will shortly proceed to do extensive work in the Perth and Lièvre districts, where Captain Adams and the Lièvre River L. & P. company have been merely prospecting awaiting this enlargement. We have no doubt this new company will prove the theory of extensive operations to be a correct one and we wish them every success.

BRITISH AND CANADIAN MINING AND MICA COMPANY.

Application has been made by this company for Letters Patent of Incorporation, under the Canada Joint Stock Companies Act, with power to mine for mica, feldspar, asbestos, phosphate of lime, plumbago, iron and other metals and minerals in the Province of Quebec. The incorporators are Messrs. W. A. Allan, L. H. Shirley, and B. H. Buckstone, London, England. The company have secured some valuable mining locations, and will engage in active operations without loss of time.

The Phosphate Mines of Canada.

BY DR. SMALL.

(In the Mining Journal, London, England).

This is a common mineral in the limestones of the Laurentian rock, sometimes disseminated in minute blue or green crystals, and at other times so abundant as to make up a great proportion of the rock, and in some cases to form beds of a nearly pure crystalline apatite. Of late years the increasing demand for phosphates as fertilisers of the soil has drawn attention to the use of this mineral in a prepared form, and the large supplies existing in Canada are now receiving considerable attention. In the "Geology of Canada" the apatite deposits of the district lying back of Kingston are described as beds. Dr. Sterry Hunt, in his early reports of 1863-66, when attention was first called to the existence of this mineral in Canada, stated that though it did occasionally occur in beds, the workable deposits were "with few, if any, exceptions confined to the limestones." His reasons for regarding most of the deposits as concretionary veinstones depended upon such facts as "banded structure," the "presence of drusy cavities," and the rounded forms of certain crystals, indicating, as he styles it, "a process of partial solution succeeding that of deposition." Professor Harrington says in his report on the apatite district of Ottawa, as a rule the apatite-bearing veins are characterised rather by "a want of regularity or order in the arrangement of their constituents than by any degree of symmetry." Instances do occur, however, where they show a banded structure. Veins with sharply defined walls, as in metaliferous lodes, are rarely seen, the vein and counter rock merging into each other. Dana says such a blending of a vein with the walls is a natural result when its formation in a fissure takes place at a high temperature during the crystallization of the containing rock. Dr. Sterry Hunt regards many of the apatite veins as fissures or cavities which have been filled by the deposition of materials derived from the adjacent strata. In reply to the question so often put "what is the nature of phosphates, and how have they been formed?" it may not be out of place to mention the two sources of supply given by Dr. Dawson, an eminent authority on this point—the concentrated deposits of phosphatic matter known as guanos, which form two subdivisions, nitrogenous and phosphatic, such as the bird excrements occurring only in the exceptionally dry climates of the South American coast, and the crystalline deposits of Canada, Norway, and elsewhere. In the nitrogenous phosphates the organic matter converted by decomposition into ammonia salts remain as part of the mass. In phosphate guanos the rain has removed the soluble ammonia salts, but has left the phosphatic material. This class of guanos is met with in the West India Islands, and Dr. Dawson thinks the deposits in the South of France known as Bordeaux phosphate are of a similar nature, and may be also traceable to mussel mud, or the accumulations in shallow tidal estuaries of molluscs and other marine organisms. Coprolite beds, such as those of the eastern countries of England and of South Carolina, have resulted from concretionary action, the slow process of drawing together of like particles in the mass, fragments of shells, bones, &c., serving as a nucleus, and when the material is abundant such concretions coalesce, and form layers. The word coprolite, however, should be confined to the fossil excrements existing in abundance in certain localities on the eastern

coast of England of various animals, notably the saurian monsters of the antediluvian shores. In the Laurentian rocks of Canada, says Dr. Dawson, are a great volume of sediments deposited in the earliest ocean of which we have any trace, but which originally, resembling those of later seas, have been so completely altered that their materials have entered into new combinations, and have become entirely crystalline, resembling now the original deposits as little as do the crude ingredients of glass the finished product. There can be no doubt of the original sedimentary origin of these Laurentian rocks, mussel muds, sands and coprolite layers being changed by volcanic or igneous action to wholly crystalline rocks. To substantiate this it is shown how limestones thus acted on would assume a crystalline character as marbles, beds of a peaty or coaly nature would pass into crystalline carbon or graphite, and phosphatic layers would appear as crystalline calcic phosphate or apatite. All these substances are found in close contiguity in the Ottawa district, an evidence pointing directly to the correctness of the theory. The greatly disturbed character of the Laurentian rocks explains the great irregularity of the apatite deposits, layers and veins, which may, before the great folding and kneading together of these rocks, have possessed regularity and uniformity, but through excessive disturbance have been dislocated in every sense, leading to the production of large pockets and irregular masses connected only by narrow and twisted seams; they may even appear to occupy completely isolated portions. The broad zones containing workable deposits of apatite and intervening belts offering little encouragement for the miners are shown in a map published by the late Mr. Vennor in the Geological Survey Report of 1876-77, and a reliable clue is thus given to prospectors where to direct their researches.

Mr. Torrance, lately on the Geological staff, states that the heaviest apatite deposits lie along the valley of the Lièvre, but proceeding eastward or westward from this river the deposits become more and more mixed with calcite, until they finally cease to be profitable for mining. The various forms in which apatite presents itself in the Ottawa district are as crystals sometimes of large dimensions, in masses varying from compact to coarse granular, in strata of a lamellar texture, and in a friable variety which is abundant, known as "sugar phosphate." The latter on account of its friability is much easier to grind than the compact masses, but is more apt to undergo loss in handling. This could be obviated by barrelling, or by putting it up in coarse bags. The color varies, being various shades of green, blue, red and brown of different shades, yellow and white. Hoffman, the analyst of the Geological Survey, says that from its usual high percentage of phosphate of lime, Canadian apatite may be regarded as a most eligible material for the manufacture of superphosphate. Generally speaking it contains only small quantities of oxide of iron.

ONTARIO.—In his report on the county of Hastings Mr. Vennor, of the Geological Survey staff, in 1871, called attention to large workable deposits of phosphate existing there that had been quarried on and off for over 20 years, which he denominated as "the North Burgess Phosphate Basin," and "the Bedford, Storrington and Loughboro Basin." The former of these extends through the townships of North Burgess, South Crosby, and Bedford, and was found to have a thickness of from 2,600 to 3,000 feet, forming a belt or zone running from the north-east to the south-west corner of Burgess, south-westward through Crosby; the latter runs

through the south-east corner of Bedford township and on through the townships of Storrington and Loughboro. The width of basin is about 6 or 7 miles, and narrows in places to half that width. The available deposits of phosphate appear to occur towards its outer side. The richest deposits of this mineral occur in the townships of North Burgess, where a large number of phosphate mines, or "openings," are worked with very fair returns. Of these, 145 in number, are described in Mr. Vennor's report. (Geological Survey, 1873-74). Phosphate is met with, more or less, all through the district lying north of Kingston and Belleville, and analyses made from specimens taken in different localities gave on an average 88 per cent. of phosphate of lime.

QUEBEC.—The Laurentian mountains of the province of Quebec seem to offer greater advantages than elsewhere for mining this mineral, especially in the Ottawa district of the province of Quebec. Here, however, this industry is of comparatively recent date, and is carried on for the most part in the townships of Buckingham, Templeton, Portland, Hull and Wakefield, in the county of Ottawa. There is no doubt that this mineral is to be met with in a much wider district than the townships above mentioned; but mining it has so far been confined to these localities running in a north-easterly direction from the Blanche river across the Lièvre river into the adjoining country east of the latter. This belt is very productive, yielding a very fine quality of apatite.

(To be Continued.)

COLONIAL AND INDIAN EXHIBITION.

The Government of Nova Scotia by special arrangement with Sir Charles Tupper, have secured the privilege of exhibiting a collection of the minerals of that Province *en bloc*. This will show the mineral wealth of Nova Scotia in a much more satisfactory manner than the more scientific but less practical arrangement adopted by Dr. Selwyn for the general exhibit of the Geological Survey. The exhibit of the Provincial Government will be strong in coal and iron, and some fine gold samples will be shown, but as the work of collecting was not begun until the last of December, it is far short of a complete representation. There will be over one hundred exhibits, all of which have been shipped. The annual report of the inspector of mines will contain a short account of the minerals of Nova Scotia, in addition to the annual summary of mining progress, and an extra edition will be sent to London for distribution at the exhibition.

Among the most important and interesting exhibits that have been forwarded from Canada to the C. & I. E., went from Ottawa city. The Canadian Granite Company have sent many exceedingly handsome designs in serpentine, granite and marble, as well as specimens of the stone in the rough from their quarries.

The Dominion Plumbago Company have forwarded a very creditable exhibit, consisting of prepared stock for pencils, lubricating, electrotyping, crucibles, stove polish, foundry facings, refractory goods, pencils in the various stages of manufacture from the lowest to the highest grades—also specimens of crude graphite, including one solid block, weighing 3000 pounds.

Mr. W. A. Allan has contributed a very valuable collection of apatite crystals, one weighing upwards of 500 pounds; his exhibits of mica will not be excelled, as regards its lustre and transparency, its refractory nature or the size of the plates, some of which measure 13x8 inches; while his contribution of gold from his

mines at St. George East, Beauce County, will surprise visitors at the exhibition. It consists of a large number of beautiful nuggets, weighing from several pennyweight up to 1½ ounce, a quantity of coarse gold, and a fine display of gold dust.

AN INFLUENTIAL DEPUTATION.

**Representative Men Interested in Mining
Wait Upon the Minister of the Interior.**

THEY WANT A BUREAU OF MINING AND MINERALOGY ESTABLISHED

For a long time it has been felt by those immediately concerned in the development of our mineral resources that insufficient attention has been given in the past to the collection of statistical and other information relating to these resources and the mining industries of Canada. The eminent geologists, mineralogists and mining engineers, who visited us in 1884, as members of the British Association for the Advancement of Science, expressed surprise and regret that some such desirable records did not exist, and strongly urged that prompt steps should be taken towards supplying this want.

This has been felt to be a well-merited reproach, and prompted by a desire to see it removed a large and influential deputation, composed of representative gentlemen from the mining sections of Canada, from the Atlantic to the Pacific, waited on the Minister of the Interior on the morning of the 4th inst. for the purpose of pointing out to him the necessity of establishing a mining and mineralogical department in connection with the Geological Survey for the purpose of collecting and compiling, under an organized system, information and statistics regarding the important mineral deposits and mining in Canada. It was clearly shown how valuable public records of this nature would be to every one interested in the mineral development of the country, to whom the same should be always available. The members of the deputation, numbering 21 in all, were a unit on all points raised, and the Minister, who is ever ready to listen to and act on the suggestions of practical men, gave assurance that the matter would receive careful consideration, and practically concurred with the deputation on the essential points that were brought up in the course of discussion.

The following gentlemen composed the deputation and left with the Minister the subjoined memo., on which they desired that prompt action should be taken:—S. J. Dawson, M.P., Algoma; R. N. Hall, M.P., Sherbrooke; Jas. Reid, M.P., Cariboo, B.C.; C. H. Tupper, M.P., Pictou; Dr. G. T. Orton, M.P., Wellington, E.R.; C. J. Townsend, M.P., Cumberland; C. A. Everett, M.P., St. John; John McDougall, M.P., Pictou; H. F. McDougall, Cape Breton; T. S. Spronle, M.P., Grey, E.R.; Wm. McCraney, M.P., Halton; B. Allen, M.P., Grey, N.R.; H. Cameron, M.P., Inverness; H. N. Paint, M.P., Richmond, N.S.; C. E. Kaulbach, M.P., Lunenburg; Murray Dodd, M.P., Cape Breton; M. B. Daly, M.P., Halifax; R. G. Leckie, Spring Hill, N.S.; W. Hamilton Merritt, M.E., Toronto; David McKean, Manager Glace Bay Mines; E. Grant Powell, Ottawa.

"Whereas, it is believed that the information and statistics regarding mining and mineral developments in Canada furnished by the Dominion Government are not in keeping with the desire of those interested in such developments, and are neither sufficient nor accessible enough to supply the public with full, authentic and prompt information on these subjects; we do, therefore, wish to respectfully bring to the attention of the

Government the following desires of a section of our community:—

"1. To have full and reliable information of the mining and mineral developments, and statistics connected therewith, for the whole Dominion, published each year, as soon after the end of the year as possible.

"2. To have a medium through which information relating to our miners in all parts of Canada can be given to the public—such medium to be a monthly publication.

"This would have a tendency to bring our mining industries constantly before the public and to educate them to take an interest in sound and legitimate mining enterprises, besides giving to the world at large constant information about mineral development in Canada compiled from records and reports of a mining bureau under Government control which would be authentic and reliable."

SUGGESTIONS.

1. That a mining and mineralogical branch of the Geological Survey be established which will publish its reports separately and annually, such a branch to be presided over by an independent officer.

2. That separate reports be published at the beginning of each year of all work accomplished during the preceding year under this head throughout the Dominion.

3. That agents be appointed in the mining districts of all the provinces for the purpose of collecting and forwarding to Ottawa a monthly report containing information and statistics in connection with mines and minerals in their respective districts; also, that such information should be given in advance sheets to the public.

4. That a clause might be inserted in the Census Act, compelling miners to make periodical returns to the Government, annually or more frequently.

5. That a public assayer be appointed with residence at a central point for the convenience of prospectors in Dominion Territory in the North-west, and railway belt of the Rocky Mountains, whose duty it would be to forward to Ottawa monthly reports of the work done.

Mr. Dawson, of Algoma, stated to the Minister that Mr. W. Hamilton Merritt, Mining Engineer, had given this matter attention for some years back, and he, therefore, called upon him to explain the purpose and desire of the deputation.

Mr. Merritt stated that the important deputation was composed of gentlemen who were personally interested in mining development, or represented constituencies having large mineral interests, and that they wished to draw attention to the advisability of organizing a mining bureau or a separate branch of the Geological Survey, to give exclusive attention to mines and minerals, which had been much neglected in the past, and of which there were practically no records available at present. He also drew attention to the memorandum submitted to the Minister, and reminded him of the opinions expressed at the meeting of the British Association held in Montreal in 1884, when some of the leading members of the Association regretted that there existed no available records of Canadian mining and minerals, or statistics connected therewith, and spoke very strongly in favor of prompt steps being taken to supply this want.

Mr. Dawson, of Algoma, followed by stating that as he represented a constituency interested in mining he was in a position, as a result of many years experience, to know the great necessity of devising some policy that would advance the mining interests of Canada more or less in the direction as set forth in the memorandum which had been submitted.

Mr. Hall, of Sherbrooke, stated that this influential deputation had waited on the Minister more for the purpose of introducing this important subject to him than of dictating any definite policy. He said that the information he had received while acting on the Committee on Geological Survey convinced him that it was necessary to take some steps toward advancing the development of our mining interests.

Mr. Leckie, manager of the Spring Hill, N.S., coal mines, and Orford Copper mines in the Eastern Townships, pointed out the benefit of a

law compelling miners to make returns of mining statistics as practised in Nova Scotia.

Mr. Reid, of Cariboo, B.C., made some forcible remarks and expressed himself in sympathy with those gentlemen who had spoken before him.

Each gentleman present said something in favor of the movement, and after a few cordial remarks from the Minister, the deputation withdrew.

GATINEAU VALLEY RAILWAY.

The President of the Company Reports Progress.

CAUSE OF DELAY REMOVED.

WORK TO BE CONTINUED IN MAY.

A meeting was convened in the City Hall, Hull, on the 11th inst., to discuss the present position of the affairs of the Gatineau Valley Railway Company and the prospects for the early completion of the road.

The meeting was attended by quite three hundred persons, mostly residents of the district, among whom were many of the leading men of the County and City of Ottawa, including Messrs. Alonzo Wright, M.P.; C. H. Mackintosh, M.P.; Dr. Duhamel, M.P.P.; F. McDougall, Mayor of Ottawa; A. Rochon, Mayor of Hull; Rev. Father Guay, of Wright; Rev. Father Harnois, O.M.I.; Rev. Father Faure, of Masham; and Aldermen Heney, Cox, Durocher, and City Engineer Surtess, of Ottawa.

The chair was occupied by Warden Cormier, who stated that the meeting had been called for the purpose of giving the representatives of the Gatineau Valley Railway Company an opportunity to explain what was being done towards resuming the work of construction, and added that he hoped, in the event of the company showing that they were prepared to proceed with active work in the spring, the county would give them substantial assistance and encouragement.

On motion of Mr. Joshua Ellard that Mr. C. H. Mackintosh, M.P., President of the company, be heard, that gentlemen addressed the meeting. After giving a resumé of the company's past history, Mr. Mackintosh referred to his constant and earnest appeals to the Provincial Government to locate the lands granted as subsidy, and pointed out how impossible it had been to establish a value for this important subsidy until the lands had been definitely located. He was gratified, however, to be able to inform the meeting that the Premier, Mr. Ross, had become convinced that the location of the lands must precede the survey, and had, jointly with Mr. Lynch, Commissioner of Crown Lands, written him a satisfactory letter on this question. Mr. Mackintosh concluded by saying that he had promised to carry the enterprise through, and that he firmly believed the completion of the road would be an accomplished fact within a year and a half.

Mr. Alonzo Wright, M.P., followed with some practical suggestions and reminded the meeting that works of this magnitude could not be constructed without obstacles presenting themselves. He was aware that the delay had been largely due to the Quebec Government's action in refusing to locate the lands, and said that from what he had learned from Mr. Mackintosh he felt confident that this important scheme would shortly be carried to a successful issue. He thought that if Mr. Mackintosh did not realize his expectations within a reasonable time he would be willing to hand over the charter.

Rev. Father Guay wished to know what might be considered a reasonable time, and was informed by Mr. Mackintosh that a reliable company had entered into a binding agreement to begin the work in May if the Quebec Government would but locate the lands.

Dr. Duhamel, M.P.P., expressed his pleasure at hearing that the Quebec Government had at last consented to locate the lands, and added that if the government subsidies were insufficient he hoped the people of Ottawa county and the cities of Hull and Ottawa would do all in their power to induce the Government to give more aid.

After some remarks from Mayor McDougall, McLogne and others, Mr. Joshua Ellard moved the following resolution which was carried unanimously:

Resolved, that after having heard the explanations of Mr. C. H. Mackintosh M. P., and his promise to continue the construction by the 15th of May, 1886, and to rapidly complete the road, this meeting and the inhabitants of the Gatineau will be satisfied and gratified if that promise is carried into execution, and that this meeting warmly and earnestly urges the Provincial Government to finally locate the land subsidies, and to prepare a map showing the same."

THUNDER BAY SILVER MINES.

A St. Paul Co'y at Silver Mountain.

AN ENCOURAGING OUTLOOK.

The representative of a St. Paul syndicate, Mr. P. M. French, arrived in Port Arthur on 23rd February to prepare for early mining operations in the Silver Mountain district on a location in which he and several St. Paul capitalists are interested. They have ample capital and every confidence in the future of this mining section. Supplies and heavy freight will be taken in before the winter roads break up and buildings are already in course of construction. As soon as navigation opens a large force will be engaged in developing a promising lode, and mining will be proceeded with uninterruptedly. Some prospecting work has already been done, the result of which has determined the gentlemen now interested to prepare for permanent and systematic operations.

Regarding the Rabbit Mountain group, a correspondent of the *Montreal Herald* has written an interesting account to that paper of his observations during a comparatively recent visit to that locality. He says: "Referring to the mining district of Thunder Bay, Lake Superior, I have recently visited the Rabbit Mountain series of mines and beg to submit these notes of personal examination and enquiries about the mining industries in that section, first premising that I went there purely from curiosity, and have no personal interest in the country.

RABBIT MOUNTAIN,

so-called, is on a cluster of hills and bluffs located about 25 miles from Port Arthur and 12 miles from Murillo station, on the Canadian Pacific Railway. I found in this vicinity, and within a radius of three miles, five working silver mines, viz, the Rabbit Mountain, Beaver, Silver Creek, Porcupine and the Rabbit Mountain Junior, the latter doing prospecting work on an adjoining claim or location, which carries the original Rabbit Mountain vein (which is exceed-

ingly rich), and is owned and quietly operated by a company composed largely of St. Paul gentlemen. The main shaft of this company is down 140 feet, which is as far as they can operate it with the machinery on the ground. They are about erecting a stamp mill, and have a large quantity of good stamp rock in the dump ready for its operation. They have selected the high grade smelting ore, which will pay the expense of hauling to the station, and rail to smelting works at New York, and have already shipped several car loads, which have returned a handsome profit, and have several more ready to ship, although the fact is apparent that they have only been playing with the property thus far.

A share of

THE BEAVER MINE.

has been recently purchased by a wealthy lumberman of Manistee, Michigan, who is developing it in earnest and is already getting the machinery on the ground for steam drills, and the Manager is in New York purchasing stamp machinery. The "Beaver" vein, which cuts a bluff 240 feet high, seems to be most admirably and conveniently situated for working. On the northern slope of the bluff the vein has been uncovered downward a distance of fifty feet, showing rich silver ore all the way from the first fifteen feet, where the vein is in the trap rock. At the bottom of this open cut, fifty feet from the top of the bluff, is the first "adit level," which has been cut into the hill some sixty feet and has produced good stamp rock all the way. At the base of the bluff a tunnel has been driven 265 feet, the last twenty feet being on the vein which is very clearly defined between the slate and is here apparently rich in silver. On the southern slope of the bluff another level has been started to meet the upper level on the northern side before referred to. This level is in forty-five feet and produced good stamp-rock all the way, so there is plenty of material for the mill as soon as it can be erected. It does not require an expert to see that the "Beaver" vein is a good one, as its extent is so plainly visible and it has paid its way upon every working, and the location seems to possess every natural advantage that could be desired for cheap mining.

THE SILVER CREEK VEIN

also cuts a bluff which is now being penetrated by an adit level driven on the vein in the silver slates immediately under the trap rock of the surface. It is now producing good stamp rock in considerable quantity, which will be treated by the Beaver mill, and has also produced quite an amount of high grade ore in native and black silver. This property seems well situated for cheap and extensive mining, with Silver Creek flowing through it and furnishing abundance of good water.

The picturesque and convenient location of

THE PORCUPINE MINE

is within a mile of the Whitefish River and very much resembles the Silver Creek Mine, and, like it, is producing rich smelting ore in both native and black silver, and all of its vein rock will pay for working. It has a large dump of stamp rock ready for the mill, and a large value of high grade smelting ore has been shipped away. I was informed that an interest could be purchased in this mine, but did not learn the figure.

Around this cluster of working mines there are said to be several other outcrops of veins which are not yet developed. The good results which have been obtained from the work now going on at these mines have increased the interest in them by their respective owners to

that extent as to probably lead to a decided improvement in their manner of working and correspondingly rich results the coming season.

Further to the west again, about fourteen miles from the Porcupine mine, and in the same geological formation, is

THE SILVER MOUNTAIN,

which the writer did not visit, and will, therefore, say nothing about, or about the gold country still further west, and about 70 miles from Port Arthur. There seems to be every requisite for successful mining in this section of Canada, and it seems very strange that Canadians do not investigate its value. Investments so far have been mostly by capital from the States, and the investors appear particularly satisfied, as none of them wish to sell.

It was a surprise to find so much land in the vicinity of these mines which was apparently well adapted

FOR AGRICULTURAL PURPOSES.

With a miner's market for his products, the farmer who locates here will find a better investment than any prairie land, provided he has energy enough to clear the timber, which alone would pay for his farm. It is said that this country has been but little explored. It certainly warrants a careful examination, and what is already developed indicates great mineral resources which are only awaiting capital and better highway and railway facilities to compete with Colorado production."

Mr. A. F. Fletcher, M.P., who has had a wide experience in mine development in the principal mining centres of the world, has recently visited the Silver Mountain district in the interest of New York capitalists. On his return to Port Arthur, he expressed himself to a *Sentinel* reporter in the following terms:

"I am much pleased with the very rich showing of silver ores I have seen at the mines during my visit to Silver Mountain, and consider that capital, under the management of wise and experienced mining men, is all that is required to make the locality a flourishing and prosperous mining region in a short time.

The rock formation consists of slightly inclined strata of trap and sedimentary black, argillaceous and silicious slates, intercepted by true fissures, in which the silver occurs. The character of the formations is such that more than ordinary knowledge of formations is required by the management of mining development, otherwise much waste of capital is likely to result.

I may also mention that considering the much need of capital to open up these mines, and the undeveloped state and character of the same, I consider that the owners of mining claims in general are placing too high an estimate on their properties to induce the desired capital into the district."

Owners of mining claims will find it to their advantage to seriously consider the wisdom of Mr. Fletcher's opinion and the justice of his rebuke. It should be always borne in mind that a *prospect* is not a *mine*, that a mining claim does not possess intrinsic value until developed, and that to carry on development work requires capital. Owners will, therefore, find it greatly to their advantage, and it certainly would be an advantage to our mining industry in general, if they will be but reasonable in their demands, and hold out inducement to capitalists to come forward and develop their claims in order that they may become productive and profitable. — [Ed.]

NOVA SCOTIA GOLD FIELDS.

"PAY STREAKS."

The Editor Canadian Mining Review:

DEAR SIR—I have been much interested in Mr. Kinahan's letter on this subject in your last issue. I think that he does not quite understand the peculiarities of our gold districts. We have an immense number of comparatively small veins, running almost without exception parallel to the beds of slate and quartzite composing our gold measures. Thus a trench 150 feet long has exposed twenty veins, and similar results have been observed at depths up to 400 feet. These veins occur along the denuded crests of anticlinal folds, and it is considered that they occupy the fissures and lines of minimum pressure presented during the progress of the folding. It will be noted that our worked veins seldom exceed fifteen inches in width, and a pay-streak occupies the whole width of the vein. Thus each of these veins is practically a separate lead, and I cannot recall an instance of two neighboring veins having pay-streaks at all parallel. I gather from Mr. Kinahan's remarks that he refers to wide ore grounds. We have instances of this in the large vein of ankerite carrying limonite at Londonderry, and in the Precambrian of Cape Breton where lenticular bodies of copper pyrites occur in a thick bed of felsite. In both these mines the arrangement of the ore bodies is as described in the mine of Ovoca,—and the system of prospecting by cross-cuts is regularly practised. The pay-streak in our gold veins may be described as a line or point of maximum richness surrounded by somewhat less auriferous quartz, which gradually becomes poorer until the pay-streak ends at the line of profit. Such pay-streaks, with occasional exceptions, have a dip approaching the vertical, and in one instance at least have been followed for about 600 feet. As the veins are those of segregation, and possibly contemporaneous with the folding already referred to, the source of the gold must be looked for in the surrounding rocks. It is well known that the slates are frequently, the quartzites occasionally, auriferous; and that in each district there is a rule that all the pay-streaks dip either to the east or to the west, (the veins having an approximate east and west course.) The cause, therefore, producing these pay-streaks must be uniform throughout each district. With an apparent uniformity of distribution of gold through the encasing beds the enrichment of the veins might be sought for in local lines of comparatively greater transverse disturbance having a uniform dip due to the conditions of folding and upheaval in each district. By this means gold might be concentrated more readily along certain favouring lines and the enriching effect of feeders and flat leads lends ground to this view. If, however, the gold has been originally precipitated, possibly through the effects of organic matter, along certain lines, e.g. of a shore or beach, in comparatively narrow and frequently limited zones, then in each district, after the beds had been hardened, elevated, folded, etc., it might be assumed that portions of the veins nearest to this rich ground would receive the gold in a concentrated form. However such original causes may have laid the foundation of pay-streaks, subsequent faults, movements, etc., have in all probability greatly modified them. Practically, cross-cuts have been repeatedly driven across the measures when these rich zones have been worked out, but hitherto unsuccessfully. And now the miners agree that the chances of

success lie in trying for the possible downward extension, after a barren interval of the pay ore.

Possibly, Mr. Editor, some of your readers better qualified than I am, may throw some light on this subject of pay-streaks which is exciting a good deal of interest in our mining circles at present, and I remain,

Yours very truly,

E. GILPIN, JR.

SELL COAL BY ASSAY, LIKE ORES.

Mr. C. A. Ashburner has given, in a paper read before the American Institute of Mining Engineers, an interesting discussion of this subject.

The figures obtained by Mr. Ashburner from average samples of anthracite coal just as it is shipped to market are very interesting, as showing that the percentage of ash is always much higher than is generally supposed, and as showing that the commonly received analyses must be taken as representing only picked samples. It would be a very easy matter to sample the coals as they are shipped by an automatic sampler that would give a correct average. And we hope something of the kind will be done. In the meantime, Mr. Ashburner's sampling and analyses are extremely instructive if not startling, and show the advisability of buying coal by analyses, as ores are purchased. This is the only way in which the purchaser will be sure of getting what he wants. There would be no difficulty in establishing a scale of fuel ratios that would represent the actual economic value of coals containing given percentages of ash and fixed carbons, and the sampling and analyses could be very cheaply and easily made.

It is certainly very remarkable that so important and expensive an article as coal should be purchased without any test whatever of its value, and merely on the "say so" of the vendor.

The company that will introduce this system of selling coal by analyses, or by its economic value as determined by actual test, will be a public benefactor, and will certainly gain a large business.—*Engineering and Mining Journal*.

On next page will be found an article, by Mr. A. Tournet, on this very subject, descriptive of the practice of purchasing coal by analysis which has been rigorously adhered to by the large railway corporations of France for many years back.

The discovery of gold in Honduras is likely to prove as important as any of the great placer districts of California. The new gold field is in the eastern portion of the republic of Honduras, about 150 miles from the Atlantic coast and adjacent waters of the Gnyope River. In some places the ground yields \$7 to \$10 per cubic yard.

La Trinidad (of Sonora): We regret to see that the English promoters of this property persist in paying dividends that are not derived from the product of the mines, one having been declared on the 28th of January, 1886, of \$1.25 per share on the capital stock, or \$125,000. We once more warn our English friends against being gulled in this transparent way. Including this dividend, this company now stand before the English public as having paid the shareholders three dividends, each of \$125,000, or in the aggregate \$375,000, an amount that we confidently assert was not derived in bullion from La Trinidad mines in 1885 over and above cost of extraction.—*Financial & Mining Record*.



All correspondence under this head, and scientific exchanges, must be addressed to the Science Editor, Canadian Mining Review.

Descriptive and Determinative Mineralogy.

The science of mineralogy has few students and fewer proficient; it is certainly one of the most neglected amongst the natural sciences. Yet its influence and importance would be obvious if public attention were once drawn to the many services our science renders to modern society. In fact, without mineralogy it is difficult to conceive what would become of our boasted civilization. Lack of beauty and interest cannot be consistently urged as a plea for the surprising neglect to which this science is consigned by otherwise well educated persons.

In our opinion the only reason why mineralogy is so little appreciated is the in attractive form in which it is presented to the beginner. Many a study once deemed unbearable to the youthful mind is now to be found in every programme of studies, even those of public schools. Why? Simply because skilled educators discovered the proper method of instruction in that particular line of study. Sooner or later the same success must attend the teaching of mineralogy.

Two methods dispute the field of mineralogical teaching, the descriptive and the determinative. The former presents at a single glance the complete system of the science, ranges each species in its natural order, and then enters into the details and characteristics of each; the latter at the outset only draws certain lines of classification, and opens up many divergent paths, which if faithfully followed, will finally lead the mystified student by numerous ramifications and cross-roads, to this or that species without a single kindly allusion to its place in the mineral kingdom. The one throws at once upon the subject the full light of classified knowledge, and lays at the feet of the student the treasures painfully acquired by toiling generations of scientists; the other ushers the tyro into the dark labyrinth of determinative tables, presents him with a smoky taper and a frail thread and with a sparing hand doles out to him only such information as he has manfully battled for. The descriptive method is a beautiful list of answers richly illustrated; the determinative a series of knotty problems with jet black interrogation points for answers. The first is universally adopted in classical courses, and whenever only a limited time can be devoted to the study; the second is a favorite with all practical men and scientific students in general.

Now, which of these methods should be preferred for the young man who enters upon the elements of the science, for the man of the world who once in a while diverts his attention from daily duties to direct it to the study of nature? Which is preferable for the student for whom mineralogy is only one stone in the stately building of our high school and college educational systems? As we have already said, the descriptive method has been heretofore preferred in these circumstances; and many reasons tend to justify that choice. Clearness and precision are the two important qualities looked for in teachers and text-books, and in this respect descriptive mineralogy has an uncontested advantage. After laying down the general prin-

ciples of the science, explaining what is meant by the crystallographic, chemical and physical characteristics of minerals, it describes the species, each in the particular group in which its analogies have placed it, and after a uniform plan which permits the student to find immediately any property of such minerals as he may want to study.

Yet this method is objectionable in more than one respect. First, chemistry, the source of all the laws which regulate the intimate relations of matter, the ground-work of all natural history, but in a greater degree of mineralogical science, has been almost totally excluded from our text-books of descriptive mineralogy. The result of such omission can easily be anticipated. The description of minerals becomes little else than a long and tedious catalogue of species, with no other binding link than the heading of the group, the reason of which is no better understood than many of the characters which are so minutely detailed.

Again, if mind culture must be considered in the choice of a method, the descriptive, precisely because it removes all difficulties from the student's path, proves very defective; for it is the maxim of all educators that everything must be presented to the young in the interrogative form, and the solution be given as a reward for patient inquisitiveness. Without that, the learning of mineralogy is simply a work of the memory which tries to store away in the shelves of the mind those long lists of cacophonous names and obnoxious figures which, though they may represent hardness, specific gravity, fusibility, etc., are withal an acquisition of doubtful utility for the young mind. Be that as it may, mineralogy thus presented is totally devoid of interest, and experience teaches that if a student preparing for examination or otherwise is compelled to learn this kind of science, he soon rids himself of such a burden the moment the pressure is removed from his mind.

What adds to the aridity of this method is the absence of personal experimentation on the part of the student. For even though you should place in his hands the necessary instruments and reagents, he is not inclined to verify properties so clearly affirmed by the learned author. But give him a specimen to determine, then as the solution depends upon the accuracy of his observations, curiosity, the inheritance of all men, gives a lively interest to every test and experiment. In this Determinative Mineralogy has a decided advantage. Must we, however, on that account, give it the preference? We hope, in our next issue, to give a satisfactory answer to this question.

Organization of Testing Departments in Railroad Companies.

The need and necessity of determining the value of everything, of ascertaining the purity of products or of metals, or of discovering falsifications or frauds, have been so generally recognized in France and in several other European countries, that all great companies, manufacturers and merchants, buy or sell nothing except on a bulletin of analysis, signed by a well known chemist.

The great railway companies that have their central administrations in Paris, have a very complete organization.

The testing department renders a continual service to these establishments, by causing such substances to be accepted as answer by their purity, or degree of purity, to the requirements and to the conditions imposed on the contractor; or again, by causing all defective substances to be rejected.

Each railroad company has a perfectly organized laboratory, and an experienced attendance charged with the chemical tests, and mechanical trials.

Railroad companies, as is known, consume a great quantity of fuel,—coal, coke, etc.; and consequently make important contracts with their suppliers.

Each contract is made by indicating the quantity of fuel to be delivered daily or by the month, at determined points: and the quantity of ashes, for a thousand parts, that these combustibles should leave after incineration, the quantity of gas produced, and that of coke obtained from the combustibles, as well as their calorific power are equally determined and stipulated in the contract.

What is more, the ashes are tested to determine the quantity of potash they contain; the ashes rich in potash are called fusible, they attack by corroding the bars of the grate of a locomotive and thus greatly diminish their durability.

When the fuel delivered is of better quality than stipulated for in the contract, the supplier receives a premium calculated according to the richness and price of the combustible; if on the contrary the combustible is inferior to what it should be, the contractor incurs a fine which is deducted from the payment, and which, like the premium, is calculated so much per cent. below the value that the fuel should have.

It is seen that this system is very equitable, as much so for the vender as for the buyer; everything encourages the contractor to deliver good combustibles.

As soon as the fuel arrives at the ports or stations, a sample is taken from each shipment and put in a special case which is then sealed and forwarded to the laboratory to have it appraised.

For those combustibles transported by cars, a sample is taken from each car; for *briquettes* a brick is taken from each car; for coal or coke a basket; each brick bears an inscription indicating the name of the contractor, the date of delivery, the number of the car, and the name of the station at which it was received; the *briquettes* as well as the coal and coke, are put in boxes and forwarded to the laboratory of the company where the chemists proceed to examine them.

The laboratory addresses every day to the principal inspector of the company, a detailed report on the combustibles tested, and every quarter a general table is drawn up, so as to settle with each contractor.

When a new contractor is accepted by a company, the laboratory is charged to seriously examine the value of the combustible that he offers, to see whether it does not contain property injurious to the working of the machine; in a word, the laboratory makes a complete analysis, and a thorough examination; it is this report that serves as the base for the conditions of the contract.

A. TOURCHOT.

Mineralogical Society.

There is not a city in the Dominion which, in proportion to its population, affords more facilities to the lover of science than Ottawa.

Apart from its many other advantages, its literary and scientific societies are so numerous and prosperous as to deserve special recognition. One of these in particular, the Mineralogical Society of the College of Ottawa, cannot fail to interest the readers of the MINING REVIEW.

To the kindness of its Director we owe the following interesting details concerning its object and constitution.

The general object of that association is to promote the study of mineralogy and the allied sciences, chemistry and geology. It attains that object in a twofold manner—first, by encouraging personal investigation and discovery, and affording persons already conversant with scientific subjects an opportunity of exchanging and discussing ideas on the same; secondly, by fostering a taste for these studies among the students of the college and other young men, and, at the same time, acquainting them with the fundamental principles of mineral chemistry and geology.

The membership of the Mineralogy Society is open not only to students of the University, but to all outsiders interested in science. It includes Professors of the Faculty and other scientific gentlemen, as well as students and other young men standing on more or less advanced steps of the scientific ladder. Persons wishing to become members should apply to the secretary.

Meetings are held every Wednesday at 5 p. m., at which original papers are read and discussed, and popular science lectures are given, accompanied by experiments. Admission to the meetings is free, and a general admission ticket may be obtained by applying to the President of the Society. The chemical and mineralogical laboratory and museum of the College, which will soon be completed, are put at the disposal of members; and all necessary apparatus and reagents are furnished on special conditions.

In order to increase its sphere of usefulness, the Mineralogical Society respectfully requests the co-operation of the science-loving public, and particularly of those interested in mines, quarries, etc. Information of any kind and specimens of minerals, rocks and fossils are thankfully received; in return, the Society makes a determination of such specimens when requested and inserts the names of the donors in its publication. The society, having secured the services of the College Professor of Chemistry and of an eminent French chemist and analyst, is now in a position to supply the daily increasing demand for mineral analyses.

The Society was formed in March, 1880, by the Rev. C. F. Marsan, O.M.I., M.A., Professor of Chemistry, Mineralogy and Geology in the College of Ottawa, with the assistance of Mr. (now Honorable) P. S. Poirier, and other scientific gentlemen. Hon. Senator Poirier, whilst Postmaster of the House of Commons, occupied the presidential chair of the Society till the beginning of the present year, when his removal to the Maritime Provinces made it impossible for him any longer to conduct the business of the Society.

The following are the officers for the present year:—

Director: Rev. Prof. C. F. Marsan, O.M.I., M.A.

President: Mr. Walter A. Herckenrath, of Mamaroneck, N. Y.

Vice-President: Mr. Wade Smith.

Recording Secretary: Mr. Jas. Foley.

Scientific Secretary: Mr. Alfred Lussier.

Treasurer: Mr. Patrick Griffin.

Chemist: Mr. Anatole Tourchot.

Librarian: Mr. David Phalen.

Curator of Museum: Mr. Duncan Campbell.

Scientific Committee: Rev. James Moloney, O.M.I.; Rev. Germain Gauvreau, O.M.I.

Pennsylvania made 68 per cent. of all the Bessemer steel rails, and 65 per cent. of all the ingots produced in the United States in 1885.

SCIENTIFIC NOTES.

SULPHUR.—It is reported that large deposits of sulphur have been recently discovered on the southern slopes of the Caucasus Mountains.

QUARTZ.—There seems to be a dispute, at present, as to whether the permanent polarity of quartz, lately discovered by Dr. Tumlirz, is diamagnetic or paramagnetic.

VESUVIUS.—After the late eruption of Vesuvius, on Feb. 6, the chloride crusts of lava in the vicinity were found to be very rich in copper, so that the bootnails of visitors to the spot became thickly plated with it.

WATER GAS.—A series of experiments in the reduction of iron ores, carbon monoxide, superheated steam, and water gas being employed as reagents, gave the following total results of oxidation for one series of specimens: Carbon monoxide 81.12 degrees, steam 84.75 degrees, water gas 86.48 degrees, thus giving water gas an advantage of 5.38 degrees over carbon monoxide, and 1.73 degrees over superheated steam.

HEAT.—A recent writer in the *Geological Magazine* ventilates an idea that is certainly novel and original, viz.: that the interior heat of the earth will yet be utilized by man. He is of opinion that the crust, which separates us from the molten mass below, is not so thick as is generally supposed, and considers it one of the possibilities of the future that we shall 'bore down to the liquid layer, and conduct our smelting operations at the pit's mouth.'

MINERALOGY.—The author of the *Rudiments of Mineralogy*, recently published by Crosby & Lockwood, London, has devised a new torment for beginners. In addition to the specific gravity of elements as compared with water, which learners usually find sufficiently difficult to remember, Mr. Ramsay gives the specific gravity taking hydrogen as the standard unit. As an example of what students are required to tax their memories with, the specific gravity of native silver is given as ranging from 115, 123 to 117, 369.

GEOLOGY.—The latest as well as one of the most important contributions to geological science is, *Geology, Chemical, Physical and Stratigraphical*, by Prof. Prestwich, of Oxford University, the first volume of which has just been issued from the Clarendon Press. Those portions of work are particularly valuable, which embody the results of the learned Professor's original researches. Prof. Prestwich belongs to the non-uniformitarian school of geologists, holding that the action of physical forces in the geological periods constantly varied in degree and intensity.

BOOK NOTICES.

AN INTRODUCTION TO THE STUDY OF THE COMPOUNDS OF CARBON, OR ORGANIC CHEMISTRY, By Ira Remsen. Ginn, Heath & Co., Boston, 1885.

This excellent text book, though published a few months ago, is very little known in Canada, we have therefore much pleasure in bringing it to the notice of our readers. It is impossible, in a brief sketch, to enumerate all the merits of this book. The author has evidently written it for students beginning the study of the com-

pounds of carbon with or even without a teacher. He carefully avoids, in the beginning, long theoretical considerations from which the beginners can derive no benefit. Throughout the book the relations of various series, the general properties of groups, and important laws of formation, are indicated only after the facts illustrating them have been described and experimented upon. Nothing so confuses the student as the grouping together of a mass of laws and speculations before acquainting him with facts, thus giving him the very false notion that natural science is a kind of castle in the air, too distant for clear observation. Another very common defect, from which Mr. Remsen's work is free, is excessive comprehensiveness. All cannot be told in a text book, so that if an author attempt to give the abridged history of every compound, his work becomes nothing but a dry nomenclature of facts and formulas. It is far better to choose some typical compound in each series, and give a full description of it; the knowledge then conveyed will be complete in its kind, and the student may afterwards, by himself, repeat the same work upon each of the other members of that series. To those acquainted with Wentworth's *Geometry*, or any other of the classical publications of Ginn & Heath, it is needless to say that this edition is a masterpiece of typographical neatness and beauty.

OTTAWA FIELD NATURALIST'S CLUB: Transactions No. 6; Vol. II, No. 2.

We have just received this, the best publication yet issued by our local scientific club. It has only one defect, it comes too late, and the reader cannot but feel disappointed when he finds out that all the papers included in that volume were delivered before March, 1885. Many of those papers are very interesting. We published in our issue of February, 1885, the paper of Mr. Chas. Willmott, "Minerals of the Ottawa District." Among other valuable papers Mr. William Lett's very interesting essay on the "Canadian Otter" deserves special notice. Mr. Latchford's "Observations on the Terrestrial Mollusca of Ottawa and Vicinity," must necessarily be in the hands of all students of our shells. Finally, geologists will find a valuable addition to our knowledge of the Trenton fossils in the notes on "Two New Species of Crinoids," by Mr. Walter R. Billings.

MINING NOTES.

NOVA SCOTIA.

It is reported that a rich gold lead has been discovered in Yarmouth county, not far from Pubnico.

Active prospecting was carried on in Lunenburg and Queen's counties last autumn, and the discovery of some important gold-bearing quartz veins was the result.

During the past month gold was discovered at Carlton, Yarmouth County, and applications for licenses to work have been made to the mines department at Halifax.

Early in February, two gold bricks were brought to Halifax from the Salmon River and Rawdon mines. That from the former weighed 1,297 ounces, and from the latter, 155 ounces.

The discovery near Nictaux, Annapolis County, made some months ago has led to the discovery of several other quartz veins showing free gold.

A stamp-mill is to be established at the McGuire gold mine at Whitburn, Pictou County, and owners of adjoining areas have consented to co-operate in defraying the cost of its erection and equipment.

Mr. James Fraser is making a determined effort to have the mining laws of the province amended. As they stand at present, they are in some respects inconsistent, although generally liberal and equitable.

The Pleasant River gold mine has been sold to a Duluth firm for \$19,000. The property has been fairly developed and promises well. The main shaft is down 35 feet, and some of the quartz now being taken out, carries 2 oz. in gold to the ton.

Recent operations by the Kempt Gold Mining Company at their mine at Little Lake, near Kemptville, have disclosed a remarkably rich lead. This has had the effect of establishing the value of Yarmouth County gold mines and the shareholders of the Kempt Company are much encouraged.

In the Oldham district there are 40 gold-bearing leads, and the output, up to the present time, has been about 2,500 oz. For many years, gold-mining in Oldham was carried on in a primitive style, trenches being made to the depth of 20 feet, which, after the quartz was taken out, were allowed to fill with water.

NEW BRUNSWICK.

There is every prospect that activity will be seen during the coming summer at the Manganese mines in this province, notably in Albert County.

Development work will in all probability be started shortly on some important leads of stibnite discovered last autumn. Samples of the ore were assayed in New York, and found to carry 65 per cent. of antimony.

A sample of quartz from a three inch lead recently discovered near Sackville, Westmoreland County, has been analyzed in New York, and found to contain 5 oz. of gold to the ton. Experts believe that the lead increases in width below the surface.

QUEBEC.

An average of 65 men have been employed at the "Emerald" mine, Ottawa County, during the winter, and by the time navigation opens there will be upwards of 3,000 tons of phosphate ready for shipping.

The Phosphate of Lime Company have given employment to 120 men during the winter at their "High Rock" mine in Portland West, Ottawa County, and will have 3,200 tons of ore on hand for shipment when navigation opens.

Since the shipping season closed last autumn the Dominion Company have raised 3,000 tons of phosphate from their "North Star" mine in Portland West, Ottawa County, and have given employment to an average of 75 men.

We are informed that the Union Company have done good work during the winter at their mines in Portland West and have a large quantity of phosphate ready to go forward, but we have not received further particulars.

Great activity prevails at the Colrairie Asbestos Mines. The Anglo Canadian Asbestos Company have a large force at work and are putting in air-compressors, steam-pumps and drills, and other expensive machinery, with a view to equipping their mine for permanent and extensive working.

At the St. Onge Gold Mining Company's Mine, at St. George East, Beauce, work has progressed rapidly during the past month. A drift is being run from main shaft towards the centre of the old river bed. Much rich ground has been crossed by the drift and a quantity of coarse gold taken out. The objective point is now but a short distance from the end of the drift, and when reached it is confidently expected that marvellously rich ground will be found on bed rock.

ONTARIO.

(Thunder Bay District.)

Many specimens of rich ore from the east end of Silver Mountain have been forwarded by the mineral committee to the Colonial and Indian Exhibition.

Surveyor McDougall and party have returned from a new discovery which they have surveyed and Surveyor Russell is now engaged in laying out still another.

Work has been resumed on the east end of Silver Mountain and it is stated that silver is visible in the ore taken out and lying in the drift made by the Cleveland company.

It is currently reported that the Crown Point mine, a quarter of a mile north of the east end of Silver Mountain, has been sold to American capitalists who intend erecting a stamp-mill without delay.

The Peerless Mining Company, of Lake Linden, Michigan, affirm that they will soon begin to operate a claim located by their agents last year about 3 miles S. W. of the Porcupine mine.

The Algoma Mines Company have received estimates for crushing and concentrating machinery to be erected at their mines near Black Bay, about 35 miles east of Port Arthur, and will, it is thought, proceed with active mining and milling early in the spring.

Medicine Bluff, at the southwest end of Whitefish Lake, is described as a valuable location, 400 feet in height, slate capped with trap, and having veins carrying silver, gold, copper, iron, alum, etc. A tunnel some thirty feet in length has been driven into the hill to cut the vein about 250 feet below the summit.

BRITISH COLUMBIA.

There are over 1,500 miners in the Granite creek, Colville and Similkamien districts, and it is expected that the number will reach 20,000 before the middle of summer.—*Yakimer Signal*.

Twenty odd white men and a number of Chinamen have started in to prepare for active mining on Scotch Creek. Reports from this camp are very favourable, and the Shuswap drift is progressing well.

The advisability of establishing a trail between Yale and Granite Creek mines is being seriously considered. It is claimed that a practical trail can be found from Yale to the mines that will not be more than half the length of the present route.

Miners have started in to work on Granite Creek and are getting good returns. Other creeks, viz., Slate, Cedar, Champion and Collins, are nearly all taken up and active preparations are going ahead for mining as soon as the ground is clear of snow.

The Tulameen river seems likely to be the principal mining ground during the coming season. The Chinese last year took out a large amount of gold; but the whites got in too late to allow of working their claims—they were, however, all well prospected.

NEWFOUNDLAND.

Capitalists have taken up the Placentia mines and will work them to some extent in the near future.

A new and valuable discovery has been reported at Bett's Cove, where the copper mines have been comparatively idle of late.

The Briggs gold field has been favourably reported on by mining experts, and as auriferous quartz occurs in quantity in that region, it is expected that gold mining will be engaged in ere long.

At Little Bay copper mine, operations have been resumed under a new management. Two hundred men are now at work, and when spring opens, it is not improbable that 600 to 700 men will be employed.

Last summer Newfoundland was visited by a number of mining engineers for the purpose of inspecting certain mineral deposits. They were favourably impressed with the prospects for the future of mining industries on the island.

UNITED STATES.

All of the iron mines in the vicinity of Hillarton, Lehigh Co., Pa., are in active operation.

The present outlook for ignot copper is favourable, there being very little spot coppers now on hand.

Dividends to the amount of \$1,152,450 were paid by United States mining companies in the month of January.

Of the 4,529,869 net tons of pig iron produced in the United States in 1885, Pennsylvania made 2,445,496 tons, or over 56 per cent. of the total.

The report of the Father de Smet mine, presented at the annual meeting, shows that 106,855 tons of ore, of an average value of \$3.57, were milled during 1885. The receipts were \$381,697.41; disbursements \$226,100.66, leaving annual profit of \$155,596.75.

McIntyre & Lewis,

BARISTERS, SOLICITORS & NOTARIES PUBLIC

Conveyancing of Properties and Mineral Rights.

OFFICES: - **Union Chambers, Ottawa.**

(adjoining Canadian Mining Review Office.)

ALEX. F. MCINTYRE.

TRAVERS LEWIS.

WOLFF & COTTON,
PROVINCIAL LAND SURVEYORS,

ONTARIO AND QUEBEC.

OFFICE, - 52 ELGIN STREET.
(Opposite Russell House), OTTAWA.

J. OBALSKI,
MINING ENGINEER.
Will examine and report on mines, and make analyses.

OFFICE, 63 ST. GABRIEL STREET, MONTREAL.

CONSULTATION FREE.



THE INTERCOLONIAL RAILWAY OF CANADA.

The Royal Mail Passenger
and Freight Route,

BETWEEN

CANADA AND GREAT BRITAIN,
AND

direct route between the West and all points on the Lower St. Lawrence and Baie des Chaleurs, also New Brunswick, Nova Scotia, Prince Edward Island, Cape Breton, Newfoundland, Bermuda and Jamaica.

New and elegant Pullman Buffet Sleeping and day cars run on through Express trains. Passengers for Great Britain or the Continent, by leaving Toronto at 8.30 A.M. Thursday, will join Mail Steamer at Halifax A.M. Saturday.

Superior Elevator, Warehouse and Dock accommodation at Halifax for shipment of grain and general merchandise.

Years of experience have proved the Intercolonial in connection with Steamship lines to and from London, Liverpool and Glasgow to Halifax, to be the quickest freight route between Canada and Great Britain.

Information as to Passenger and Freight rates can be had on application to

E. KING,
Ticket Agent,
27 Sparks St.,
Ottawa.

ROBT. B. MOODIE,
Western Freight and Passenger Agent,
93 Rossin House Block,
York St., Toronto.

D. POTTINGER,
Chief Superintendent,
Railway Office,
Moncton, N.B., Nov. 13th, 1885.



NOTICE TO CONTRACTORS.

CHANGE OF TIME.

THE time for seeing the plans and specifications for the

INFANTRY SCHOOL

—AT—

LONDON, ONT.,

Is hereby changed to TUESDAY, the 23rd instant, and the time for receiving tenders to WEDNESDAY, the 7th APRIL.

By order,
A. GOBEIL,
Secretary.

Department of Public Works,
Ottawa, 12th March, 1886.



SEALED TENDERS, marked "For mounted Police Clothing Supplies," and addressed to the Hon. the President of the Privy Council, Ottawa, will be received up to noon Thursday, 18th March, 1886.

Printed forms of Tender, containing full information as to the articles and quantities required, may be had on application to the undersigned.

No tenders will be received unless made on such printed forms. Patterns of all articles may be seen at the office of the undersigned.

Each Tender must be accompanied by an accepted Canadian bank cheque for an amount equal to ten per cent. of the total value of the articles tendered for, which will be forfeited if the party making the tender declines to enter into a contract when called upon to do so, or if he fails to complete the service contracted for. If the tender be not accepted the cheque will be returned.

No payment will be made to newspapers inserting this advertisement without authority having been first obtained.

FRED. WHITE,
Comptroller,
N. W. M. Police.
Ottawa, Feb., 24th, 1886.



DEPARTMENT OF INLAND REVENUE.

AN ACT RESPECTING AGRICULTURAL FERTILIZERS.

THE public is hereby notified that the provisions of the Act respecting AGRICULTURAL FERTILIZERS came into force on the 1st of JANUARY, 1886, and that all Fertilizers sold thereafter require to be sold subject to the conditions and restrictions therein contained—the main features of which are as follows:—

The expression "fertilizer" means and includes all fertilizers which are sold at more than TEN DOLLARS per ton, and which contain ammonia or its equivalent of nitrogen, or phosphoric acid.

Every manufacturer or importer of fertilizers for sale, shall, in the course of the month of January in each year and before offering the said fertilizer for sale, transmit to the Minister of Inland Revenue, carriage paid, a sealed glass jar containing at least two pounds of the fertilizer manufactured or imported by him, with the certificate of analysis of the same, together with an affidavit setting forth that such jar contains a fair average sample of the fertilizer manufactured or imported by him; and such sample shall be preserved by the Minister of Inland Revenue for the purpose of comparison with any sample of fertilizer which is obtained in the course of the twelve months then next ensuing from such manufacturer or importer, and which is transmitted to the chief analyst for analysis.

If the fertilizer is put up in packages, every such package intended for sale or distribution within Canada shall have the manufacturer's certificate of analysis placed upon or securely attached to each package by the manufacturer; if the fertilizer is in bags, it shall be distinctly stamped or printed upon each bag; if it is in barrels, it shall be either branded, stamped or printed upon the head of each barrel, or distinctly printed upon good paper and securely pasted upon the head of each barrel, or upon a tag securely attached to the head of each barrel; if it is in bulk, the manufacturer's certificate shall be produced and a copy given to each purchaser.

No fertilizer shall be sold or offered or exposed for sale unless a certificate of analysis and a sample of the same shall have been transmitted to the Minister of Inland Revenue, and the provisions of the foregoing sub-section have been complied with.

Every person who sells, or offers or exposes for sale, any fertilizer, in respect of which the provisions of this Act have not been complied with,—or who permits a certificate of analysis to be attached to any package, bag or barrel of such fertilizer, or to be produced to the inspector, to accompany the bill of inspection of such inspector, stating that the fertilizer contains a larger percentage of the constituents mentioned in sub-section No. 11 of the Act than is contained therein,—or who sells, offers or exposes for sale any fertilizer purporting to have been inspected and which does not contain the percentage of constituents mentioned in the next preceding section,—or who sells or offers or exposes for sale any fertilizer which does not contain the percentage of constituents mentioned in the manufacturer's certificate accompanying the same, shall be liable in each case to a penalty not exceeding fifty dollars for the first offence, and for each subsequent offence to a penalty not exceeding one hundred dollars: Provided always, that deficiency of one per centum of the ammonia or its equivalent of nitrogen, or of the phosphoric acid, claimed to be contained, shall not be considered as evidence of fraudulent intent.

The Act passed in the forty-seventh year of Her Majesty's reign, chaptered thirty-seven and intitled "an Act to prevent fraud in the manufacture and sale of agricultural fertilizers," is by this Act repealed, except in regard to any offence committed against it or any prosecution or other act commenced and not concluded or completed, and any payment of money due in respect of any provision thereof.

A copy of the Act may be obtained upon application to the Department of Inland Revenue.

E. MIALL,
Commissioner.



NOTICE

TENDERS will be received by the Department of Inland Revenue until Monday, 12th April, prox., from parties desirous of leasing the privilege of ferrying across the Ottawa River, between the village of New Edinburgh, in the Province of Ontario, and the village of Waterloo or Gatineau Point, in the Province of Quebec, in accordance with the terms and under the conditions set forth in the Regulations, copies of which can be procured at the Department of Inland Revenue, Ottawa.

Each tender must state the amount which the party tendering is willing to pay per annum for the privilege referred to, which amount will be payable in advance, the terms of the lease being for four years and eleven months, from 1st May, 1886.

Each tender must be accompanied by a cheque marked "Good" on one of the chartered banks doing business at Ottawa, for one-half the amount of the per annum tender. This amount will be credited on account of the first year's rent in the case of the accepted tender, and all other cheques will be returned except in the event of withdrawals, in which cases no refunds will be made.

All communications must be addressed to the undersigned and endorsed on the envelope "Tender for the New Edinburgh Ferry."

By order,
WM. HIMSWORTH,
Secretary.

Department of Inland Revenue,
Ottawa, March 18th, 1886.



NOTICE.

TENDERS will be received by the Department of Inland Revenue until Monday, 12th April prox., from parties desirous of leasing the privilege of ferrying across the Ottawa River, between the City of Ottawa, in the Province of Ontario, and the City of Hull, in the Province of Quebec, in accordance with the terms and under the conditions set forth in the Regulations,—copies of which can be procured at the Department of Inland Revenue, Ottawa.

Each tender must state the amount which the party tendering is willing to pay per annum for the privilege referred to, which amount will be payable in advance, the terms of lease being for four years and eleven months from 1st June, 1886.

Each tender must be accompanied by a cheque marked "good" on one of the chartered banks doing business at Ottawa, for one-half the amount of the per annum tender. This amount will be credited on account of the first year's rent in the case of the accepted tender, except in the event of withdrawals, in which case no refund will be made.

All communications must be addressed to the undersigned and endorsed on the envelope "Tender for the Ottawa and Hull Ferry."

By Order,
WM. HIMSWORTH,
Secretary.

Department of Inland Revenue,
Ottawa, March 18th, 1886.



North-West Mounted Police TENDERS FOR HORSES.

SEALED TENDERS, marked "Tenders for Horses," and addressed to the Hon. the President of the Privy Council, Ottawa, will be received up to noon, Monday, March 29th, 1886, for supplying 100 SADDLE and 100 TEAM HORSES for the Mounted Police, to be delivered at Regina, North-West Territories, not later than April 24th.

Tenders to state the price per horse in each class, team or saddle, and may be or any number not less than one car load.

An officer of Police and a Veterinary Surgeon will examine the horses prior to shipment from Ontario and Quebec, but they will be at Contractor's risk and expense, and will not be paid for until delivered at Regina. Horses injured or falling sick in transit will not be taken over at Regina until fully recovered.

Parties tendering must state the date on which their horses will be ready, and the Railroad Station in Ontario or Quebec they select for inspection.

DESCRIPTION.

Team Horses, age 5 to 7 years, about 1,250 lbs., short-legged, active horses, sound and free from blemish, well broken, and good walkers.

Saddle Horses, age 5 to 7 years, height 15 to 15-3, well-bred sound horses, free from blemish, with good substance, appearance, and action, and well broken.

Each tender must be accompanied by an accepted Canadian bank cheque for an amount equal to ten per cent. of the total value of the horses tendered for, which will be forfeited if the party making the tender declines to enter into a contract when called upon to do so, or if he fails to produce suitable horses for inspection on the date specified in his contract, or to deliver them at Regina not later than the 24th April. If the tender be not accepted the cheque will be returned.

No payment will be made to newspapers inserting this advertisement without authority having been first obtained.

FRED WHITE,
Comptroller,
N. W. M. Police.

Ottawa, March 13th, 1886.



NOTICE.

SEALED TENDERS addressed to the undersigned and endorsed "Tender for Indian Supplies" will be received at this office up to noon of TUESDAY, 20th APRIL, 1886, for the delivery of Indian Supplies during the fiscal year ending 30th June, 1887, consisting of Flour, Bacon, Beef, Groceries, Ammunition, Twine, Oxen, Cows, Bulls, Agricultural Implements, Tools, etc., duty paid at various points in Manitoba and the North-west Territories.

Forms of Tender, giving full particulars relative to the Supplies required, dates of delivery, &c., may be had by applying to the undersigned, or to the Indian Commissioner at Regina, or to the Indian Office, Winnipeg.

Parties may tender for each description of goods (or for any portion of each description of goods) separately or for all the goods called for in the Schedules.

Each tender must be accompanied by an accepted cheque in favour of the Superintendent General of Indian Affairs on a Canadian Bank for at least five per cent. of the amount of the tenders for Manitoba and the North-west Territories, which will be forfeited if the party tendering declines to enter into a contract when called upon to do so, or if he fails to complete the work contracted for. If the tender be not accepted the cheque will be returned.

Tenders must make up in the Money columns in the Schedule the total money value of the goods they offer to supply, or their tender will not be entertained.

Each tender must, in addition to the signature of the tenderer, be signed by two sureties acceptable to the Department, for the proper performance of the contract.

In all cases where transportation may be only partial by rail, contractors must make proper arrangements for supplies to be forwarded at once from railway stations to their destination in the Government Warehouse at the point of delivery.

The lowest or any tender not necessarily accepted.

L. VANKOUGHNET,
Deputy of the Superintendent-General
of Indian Affairs.

Dept. of Indian Affairs,
Ottawa, 3rd March, 1886.

WANTED

Two Experienced Mica Cutters.

Steady employment and good wages.

Apply at Office of

CANADIAN MINING REVIEW,
Union Chambers, 14 Metcalfe St., Ottawa.

DEVELOPED AND UNDEVELOPED MINES, AND MINERALS OF COMMERCIAL VALUE, BOUGHT AND SOLD.

Mining Companies Organized and Prospectuses prepared. ADDRESS: E. G. POWELL, UNION CHAMBERS,
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CANADIAN MINING REVIEW

VOL. 4.—No. 4.

1886—OTTAWA, APRIL—1886

VOL. 4.—No. 4

ROCK DRILLS, AIR COMPRESSORS,

General Mining Machinery,

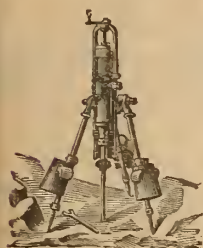
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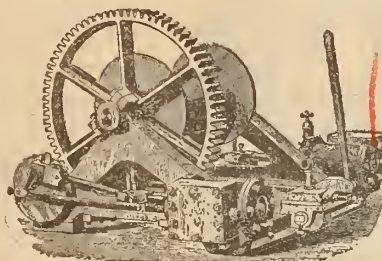
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GUNPOWDER,

Dynamite, Dualin and the new

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DOMINION AGENTS FOR

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MICA, MINERALS, PRECIOUS STONES.

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THE EXISTENCE, SIZE, AND EXTENT OF MINERAL VEINS DETERMINED.

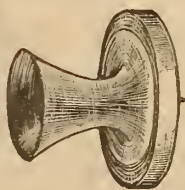
"Cores" cut from the Solid Rock showing the Nature and Dip of the Strata.

ARTESIAN WELLS PUT DOWN ANY DISTANCE TO 1,000 FEET.

FULL INFORMATION AND REFERENCES GIVEN ON APPLICATION.

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Sold outright. No
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Over 5000 in use. Pat.
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E. N. RIOTTE, Manager.

Ores Sampled, Working Test by any Process,
Assays, Analyses of Ores, Mineral
Waters and Products, Mines
Examined and Mills
started.

GRAPHITE.

Wanted, fair average
samples of about 1 lb. each,
with prices, F.O.B. Address
J. S. Merry, Assay Office,
Swansea, Wales.

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—OF THE—

OTTAWA PHOSPHATE REGION.

Copies on plain paper \$1.00
Copies on Tracing Linen 1.50

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OTTAWA

AND THE

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OF EVERY DESCRIPTION, TRUE
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Wheels and Axles for Tram
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Will issue Licenses to Prospect or
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In Eastern Ontario, and principally
within the belts containing,

Iron, Phosphate, Gold, Galena, Plum-
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For lists of lands and terms apply to
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Township of Coleraine, P.Q.
One Mile and a Half from Black Lake
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W. J. CAMPBELL & Co.,

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ing Machinery, wood or iron Dump
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Castings and Forgings.

STEEL PORTABLE AND STATIONARY BOILERS.

Always on hand a full stock of all
kinds of steam fittings, packing, &c., &c.
Estimates furnished. Terms easy.

WANTED.**Rock Breaker**

State lowest cash price, and give breadth of Jaws, diameter of pulley, and all particulars.

Address—
CANADIAN MINING REVIEW,
OTTAWA, ONT.

WANTED**Two Experienced Mica Cutters.**

Steady employment and good wages.

Apply at Office of

CANADIAN MINING REVIEW,

Union Chambers, 14 Metcalfe St., Ottawa.

PHOSPHATE PROPERTY

In the Township of Portland West,

FOR SALE.

Lots 25, 26, 27 and 23, in the 3rd range. Some excellent surface shows have been uncovered on these lots and only require capital for developing. Price and particulars given at the office of the MINING REVIEW.

The engraving represents the **Hartsfeld Transportable Water Jacketed Smelting Furnace, Metal Dust Condenser and a Separator Crucible**, manufactured by the

Rock and Ore Breakers or Crushers.

("THE BLAKE STYLE.")

This style of Rock Breaker after 15 years practical test at HOME and ABROAD has proved to be the BEST ever designed for the purpose of breaking all kinds of hard and brittle substances, such as QUARTZ, EMERY, CORRUNDUM,

GOLD AND SILVER ORES,

ASBESTOS, COAL, PLASTER, IRON ORES, MANGANESE, OCHRE, COPPER, TIN and LEAD ORES. Also for making RAILROAD BALLAST and CONCRETE.

MR. S. L. MARSDEN, who for the past twenty years has been connected with the manufacture of the "Blakes Crusher," New Haven, superintends the construction of this machine.

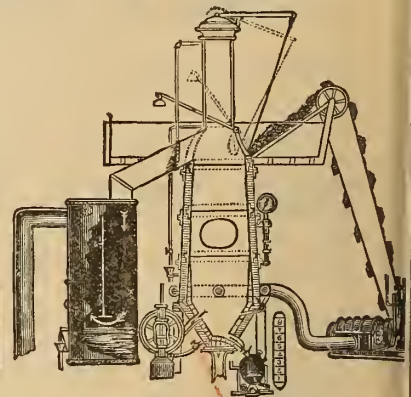
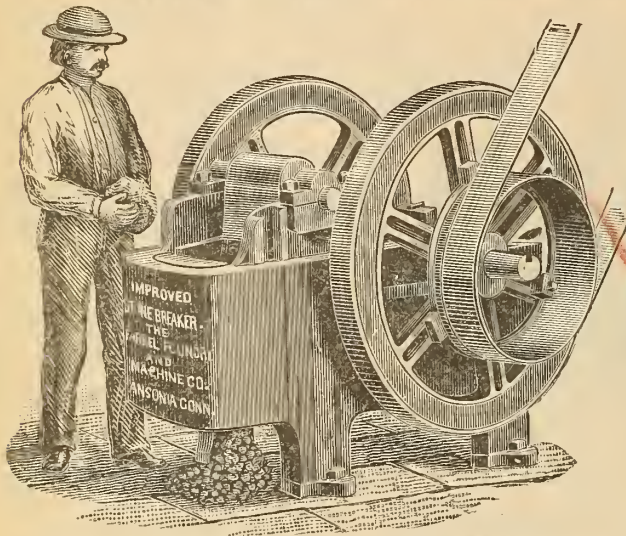
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In sizes from 5 to 60 ton capacity, and by the following licensed manufacturers of Royalty:

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Letters Patent have been secured in principal foreign countries, and are sold in shares, trade, royalty or otherwise. Run your eye over this and return answer; silence means no! Catalogue free.

This furnace requires no more care or attention than an ordinary steam boiler, and can be run as long and with as little loss of time or expense for repairs. Full information will be furnished by the

Hartsfeld Portable Smelting Furnace & Mining Co.

P. O. Box 115, Newport, K.Y., U.S. of A.
Reduction Works, No 90 and 92 Thornton St.

FOR SALE.**DEVELOPED PHOSPHATE MINE**

On which there are at present upwards of

THREE HUNDRED SURFACE SHOWS

opened up, varying in width from a few inches to TWENTY FEET; several shows from 100 feet to FOUR feet in width, and one now being worked is from SIX to TWENTY FEET wide at SIXTY FEET LONG. This last mentioned show is extending in length and is at present for feet deep.

Phosphate can be delivered on dock at Kingston for \$1.75 per ton from the mines.

Owner will sell or admit a partner.

For full particulars apply to

JAMES FOXTON,
Sydenham (near Kingston),
Ontario.

**NOTICE TO CONTRACTORS.****CHANGE OF TIME.**

THE time for seeing the plans and specifications for the

INFANTRY SCHOOL

—AT—

LONDON, ONT.,

Is hereby changed to TUESDAY, the 2nd instant, and the time for receiving tenders WEDNESDAY, the 7th APRIL.

By order,

A. GOBEIL,
Secretary

Department of Public Works,
Ottawa, 12th March, 1886.

LIDGERWOOD'S HOISTING ENGINES.

—ALSO—

IMPROVED BOILERS

SPECIALLY ADAPTED FOR

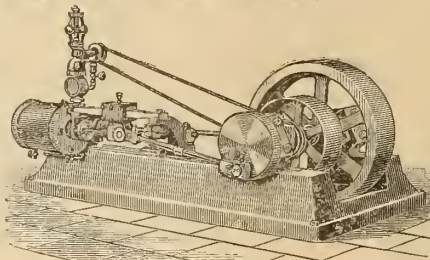
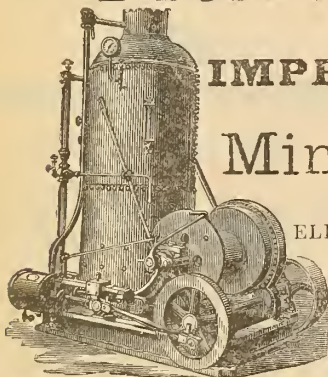
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CONTRACTORS,

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ALL SIZES.

L. STATIONARY ENGINE.



Lidgerwood Mf'g Co., 96 Liberty Street, New York

MINERS WANTED.

50 Good Miners Wanted. 50

Wages \$1.25 per day; regular board, \$3.00 per week.

For further particulars apply to

A. H. DeCAMP,
Supt. Oxford Gold Mines.
Musquodoboit Harbor,
NOVA SCOTIA

WANTED.**FIFTY EXPERIENCED MINERS.**

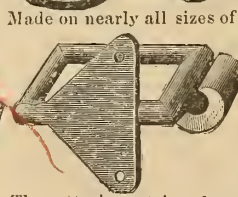
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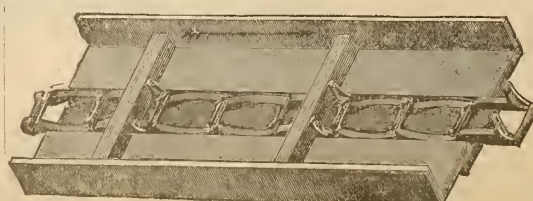
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The CANADIAN MINING REVIEW is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts as well as others interested in Canadian Mineral Lands are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 20th of the month.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

We understand a start has been made towards preparing a statistical report of Canadian mines, and while we welcome this information we would express the hope that this very important work will be proceeded with without interruption.

It now looks as though the collection and publication of mining statistics will receive some attention from the Geological Survey, but we fear the staff which has been told off for this special work, with the meagre assistance at its command for collecting and compiling statistics, is quite inadequate to do justice to this important work. The ability of Messrs. Coste and Ingall, the two Mining Geologists of the Survey, to whom this special work has been assigned, is not brought into question, but it is unreasonable to expect that these two gentlemen, in addition to performing their professional duties in the field, as heretofore, can organize and conduct the mining and mineralogical branch of the Survey, and collect and compile statistics in connection therewith in a manner that will do themselves justice or satisfy the mining public. If the information that this work is to supply is to be of any value it must be full and complete. That it may be so, it will be necessary to thoroughly organize a special branch of the Survey with an efficient and adequate staff under a competent and distinct head. Proper organization will produce valuable results, and it will be money well spent if a certain sum be set aside annually for the support of a useful mining and mineralogical department. It has been argued by the Director that the present appropriation for the Geological Survey is not more than sufficient to carry

on strictly scientific work and research. If this be so it would not be unreasonable to expect the Minister of the Interior to ask Parliament for a special appropriation to defray the expense of conducting a mining and mineralogical department in the interest of the mining public.

We have refrained from commenting on the Morrison tariff bill for the reason that it must be clear to every one interested in the production of coal and iron ore in Canada that they would be benefited by reciprocity between the United States and this country in these two articles. We would of course be much pleased to hear that Mr. Morrison had succeeded in carrying his bill as originally presented to Congress, but we have felt at the same time that nothing we could say would convince those who have so strenuously opposed the bill that they would derive substantial benefit by removing the duty from foreign iron ore, and that we advocated its removal with a purely unselfish and disinterested motive. We prefer that our cause should be taken up by Mr. Morrison, Mr. Shriver, Secretary of the New York Metal Exchange, backed by Mr. Herbert W. Griffiths, Editor of the London (Eng.) *Iron Trade Exchange*, and other able champions of free trade; but, so far, these gentlemen have not been able to befriend us against such a powerful combination as the representatives of the iron ore industries of the Lake Superior region, supported by Mr. James M. Swank, of the *Bulletin* of the American Iron and Steel Association, Mr. Wilson Day, of the *Iron Trade Review* (Cleveland, O.) and other red-hot protectionists.

If it has been proved conclusively that the manufacture of iron cannot be profitably carried on in the provinces of Ontario and Quebec, and if the vast ore deposits of these two provinces are ever to become remunerative to their owners, something must be done towards developing them. There is a market in the United States for all the ore we can produce suitable for steel making, and at a price that should return a fair margin of profit to the miner. The present duty on iron ore imposed by the United States is not a prohibitory one for the higher grade ores, and by a reasonable expenditure in improving the handling and shipping facilities, the cost of transportation could be so reduced that the reduction from present freight rates would be sufficient to cover the duty. It is childish to sit and gaze at our extensive ore deposits and wait for reciprocity or removal of the duties from iron ore by the United States.

We are not disposed to admit that iron cannot be manufactured to great advantage in central Canada. The ore is, for the most part, such as few countries can boast of, and the deposits are surrounded by dense forests of wood suitable for charcoal, and limestone beds are close at hand. In the western and eastern provinces, British Columbia and Nova Scotia, the iron ore deposits and coal seams lie almost alongside each

other, yet, where in these provinces is iron profitably manufactured? The cause for this should be searched for until discovered and then overcome. Proper encouragement should be given to those who are disposed to work out the problem and are prepared to demonstrate that iron can be profitably manufactured in Canada, and such encouragement must come from the Government in the form of a bounty on pig and bar iron, and steel, for a term of years which will be equivalent to what would be considered a reasonable duty on the same, and when it had been conclusively demonstrated that Canada is capable of supplying her market with these articles of home manufacture, then let the bounty be withdrawn and a protective duty be imposed. In his budget speech this session the Finance Minister read to the House a list of articles, which, being raw material, as he described them, would be admitted free of duty. Pig iron appears on this list, and while we object to it being classed as raw material, we would not advocate a duty being levied on imported pig until such time as we are sure of a fair portion of our requirements being supplied by home manufacturers.

THE PHOSPHATE TRADE.

The annually increasing importance of this industry in Canada is very marked. Canadian phosphate has gained high favour amongst British manufacturers of superphosphate, and if the high standard of last year's shipments is maintained the demand for it will continue to rapidly increase. These assertions are emphatically endorsed by Mr. John Dyke, the Liverpool agent of the Department of Agriculture, who, in his annual report to the Minister of Agriculture, dated Liverpool, 31st December, 1885, says: "I have had a large number of enquiries from British and continental manufacturers in reference to Canadian phosphate, for which there is an annually increasing demand. Phosphate being a new but important interest in Canada, and destined to become one of the leading industries of the Dominion, I have obtained some special information on the subject from one of the leading merchants of England, and indeed of Europe, in this particular mineral. The shipments of phosphate during the past year from Canadian mines have been of an improved quality. The grade in percentage has been well maintained, even above the average, due chiefly to the greater care taken in dressing and cleaning before the ore has been milled. Previous to last year (1884) the percentage of the ore ran about 80 per cent. to 82 per cent., while some parcels received this year (1885) have come up to 85 or 86 per cent. of tribasic phosphate of lime. There is no reason why the regular output of Canadian phosphate, or, at any rate, a larger proportion of it, should not run to 85 per cent. It might be shipped continuously as pure as that, if proper care were taken in dressing and in separating it from foreign matter. The Canadian phosphate has, during the past few years, been in great favor amongst

manufacturers, and if producers can continue, and it is thought they can, to maintain the grade shipped during the past season, there is no reason why it should not take the lead of favour for prime phosphate. Although the volume of business done during the past year has been on the increase, and above the average, prices have receded, and closed 2d. per degree lower than they began the year, the ruling rate at the close of the season being 1s. for 75 per cent., with one-fifth of a penny rise. This price ruled for the last three months of the year, and it may be anticipated that if any change does take place it must be an advance.

With regard to ocean freights, the average for phosphate shipments from Montreal to London over the past season (1885) was 5s. 6d., having varied from 3s. to 7s. per ton. To Hamburg 12s. 6d. was the ruling rate."

Up to within a very recent date no definite action had been taken in Canada for the manufacture of superphosphate. Steps, however, have now been taken which may lead to the establishment of that industry. At the Basin du Lièvre, a point convenient to the mines, a mill has been erected, and is now in running order, for crushing, grinding and pulverizing the raw phosphate rock. A bolting apparatus is affixed to the machinery by which the pulverized material is reduced to an impalpable powder. This mill has a capacity equal to the production of forty tons per day, of ten hours, and to it there are blowers attached by use of which extraneous matter is separated. It is to be hoped that before long agriculturists in Canada will see the necessity of retaining in our own country a portion of the product of the mines, so valuable for renewing lands worn out by perpetual cropping.

THE MINES.

The mine which has attracted the most attention in the district during the past year is owned by the Dominion Phosphate company, and known as the "North Star." The Dominion company were the first to engage in deep mining in the phosphate deposits of Canada, and were actuated in doing so by a desire to prove a theory advanced by eminent scientists, including Prof. Wm. Boyd Hawkins, of Manchester, England, one of the leading geologists of the day, who, in 1884, visited the phosphate mines and did not hesitate to publish his opinion that at none of the mines visited by him had a sufficient depth been reached at which it should be expected that the main body of the deposits would be met with. His theory was that the larger bodies of ore would be found at depths varying from 300 to 1,000 feet below the surface. This theory has been practically proved correct. At the "North Star" mine the main shaft, from which upwards of 5,000 tons have been raised, has reached a depth of 300 feet, at which level it is penetrating a body of ore much larger than anything ever before met with in the district, and having the appearance of the main body of the deposit.

The "Union," "High Rock," "Emerald" and "Little Rapids," as well as the "North Star," mines, are producing high grade ore in large quantity and have already upwards of 14,000 tons awaiting shipment. This, together with the output of the McLaren & Blackburn mine in Templeton, and the

less important mines of the phosphate district makes a total of about 17,000 tons which has been mined since the close of navigation last year and is now ready for shipping. As we have already stated, more attention than formerly is being given to deep mining, and those who have so directed their operations have been much encouraged.

TRANSPORTATION OF ORE.

Among the important improvements which have recently been made for the more economical and expeditious transportation of ore, may be mentioned the completion of a tramway by the Phosphate of Lime company from their "High Rock" mine to the bank of the du Lièvre River. The company will begin to forward ore over the tramway early in May and will be enabled to deliver their entire output at point of shipment without interruption and at a much reduced cost. Five new ore scows have been launched since the ice left the du Lièvre river, and Messrs. Lomer, Rohr & Co. have put on another steam tug, the "Kate," which is the best boat now on the river. There are now a sufficient number of ore vessels to supply transport accommodation that will insure the delivery of the entire output of the mines at the railway terminus during the summer months.

Transportation of ore has not yet begun on the river on account of the unusual force of the spring freshet, and ore will not begin to move until the water has sufficiently receded, which is not likely to be the case before about the 10th of May.

GRINDING PHOSPHATE ROCK.

This is the first year that this branch of our phosphate industry has been engaged in. The Portland Phosphate Mining and Milling Company's mill at the Basin du Lièvre is now working and turning out about forty tons a day of ground phosphate. About 4,000 tons of the product of the mill have been contracted for by manufacturers of fertilizers in Chicago, Buffalo and Cleveland; the two former taking low grade and the latter the higher grade phosphate. It is not unlikely that the principal market for Canadian ground phosphate will be in the United States and that for sometime to come the lower grades will be most in demand, until manufacturers have come to appreciate the value of the high grade fertilizers such as can be produced from the better quality of Canadian phosphate rock.

The Portland M.M. & P. Co. have it in contemplation to erect sulphuric acid Works alongside their mill and to establish a factory for the manufacture of superphosphate in connection therewith. This company's operations will be watched with much interest, and it is to be hoped they will make a success of this new enterprise.

Phosphate Quotations.

It would appear from the most recent quotations received from abroad that Canadian phosphate rules in London and Liverpool at one shilling a unit for 80 per cent. mineral with a fifth of a penny rise, and in Hamburg at one shilling and five-eighths of a penny per unit with a fifth of a penny rise. This is not quite so good a price as was being offered at this date last season, but it will, nevertheless, admit of a very handsome margin of profit. One shilling a unit for 80 per cent., with a fifth of a penny rise, is equivalent to \$17.25 per ton for 80 per cent. and \$18.50 per ton for 85 per cent., delivered on board ship in Montreal, with freight between Montreal and Liverpool and London at the same rate which ruled last year.

Villeneuve Mica Mine.

The British and Canadian Mica and Mining Company are now systematically at work in their Villeneuve mine and are taking out a large amount of excellent mica, but owing to a scarcity of cutters a large quantity has accumulated which awaits being cut into plates and otherwise prepared for market. As this is the first mica mine which has been opened in the district the company have found it difficult to procure additional hands, experienced in cutting, cleaning, sorting and packing, to keep abreast of the output since the force of miners has been increased, and have been obliged to send to North Carolina for this description of skilled labour. Several men of long experience in the North Carolina mica mines have been engaged and are on their way to the Villeneuve mine. There is now a rapidly increasing demand for this mica, and the mine is capable of supplying all the consumers. The drifts and cross-cuts are developing some strong micaceous leads, carrying large and perfectly formed crystals, and it may be said that the mine is now being practically worked. The feldspar, one of the by-products of this mine, is of a very superior quality and commands a market value which is nearly sufficient to pay all the mining expenses. It is very white and quite free from iron, and has been pronounced suitable for the manufacture of porcelain. The British and Canadian Mica and Mining Company are to be congratulated on having acquired so valuable a property and on the satisfactory way it has developed since they became its proprietors and took possession.

MINERAL RESOURCES OF NOVA SCOTIA.

There are in this province extensive deposits of coal and iron ore, and her gold fields are increasing in importance with each year's development. Copper, manganese, antimony, barytes, gypsum, marble, etc., also occur in abundance, and the deposits have been worked to some extent. These resources are being gradually developed, and offer a promising field to the miner and capitalist.

The Inspector of Mines for Nova Scotia, in his annual report, recently published, gives a summary of the mineral production of the province for the year 1885, compared with that of the previous year, as follows:—

	1884	1885
Gold.....Ounces	16,079	22,203
Iron Ore.....Tons	54,885	48,129
Manganese Ore....."	302	353½
Copper....."	110	.....
Lead....."	100	.....
Barytes....."	.....	300
Antimony....."	600	*758
Coal raised....."	1,389,295	1,352,205
Gypsum....."	111,068	87,644
Building stone....."	780	3,827
Coke made....."	40,085	30,185
Limestone....."	25,567	16,429
Grindstones, etc....."	2,200	2,208

* Amount exported.

COAL.

Nova Scotia coals belong entirely to the bituminous system of Dana, and may be sub-divided into coking, free burning and cannel coals. It may be remarked that the coals of this country belong to the same geological horizon of the carboniferous system as those of England and the Eastern United States, and present many points of intimate connection in fossil remains and in the associated strata.

The Sydney coal field occupies the eastern shore of Cape Breton County. Its land area is estimated at 200 square miles, and it now forms the rim of an extensive coal field extending under the Atlantic. Experience has proved that nearly all the seams can be followed in their subaqueous extension. Estimates based on the system of enquiry adopted by the Royal Commission on the duration of the coal supply of Great Britain, put the amount of available coal in these submarine areas, after making proper deductions for waste, etc., at not less than 2,000,000,000 tons. The amount of available coal contained in the seams now opened in this district, in the areas leased for the purpose of working them, is estimated at 212,000,000 tons. This estimate does not include the coal in the seams which are unopened in the land areas in operation, nor the value of the seams in the leases which are at present awaiting a favorable opportunity for development, which items would swell the coal supply of this district to figures representing many years' output greatly exceeding any yet obtained.

The following analyses show the general character of the seams of the district:—

COMPOSITION.	NAME OF SEAM.		
	Sidney.	Phalen.	Harbor.
Moisture	1-260	921	80
Vol. Comb. Matt. Fast Coking	35-514	30-312	29-40
Fixed Carbon	59-111	62-334	65-50
Vol. Comb. Matt. Slow Coking	33-840	28-625	27-85
Fixed Carbon	60-785	64-021	67-05
Ash	4-115	6-433	4-30
Sulphur	1-705	1-105	1-29
Theo. Evaporative power	8-33	8-78	9-19

The Springhill coal field lies north of the Cobequid mountains, in Cumberland County, the northern edge of which has been traced from the Joggins shore of Cumberland basin, about 18 miles, to the Styles mine, but its deflection to the south to join the Springhill coal mines district has not been followed. On the southern or Springhill side of the basin there is a large and important development of coal seams. The productive measures stretch for many miles in a westerly direction to the Cumberland basin at Apple river, but have not yet been prospected. The chief development has been at Springhill by the Cumberland Railway and Coal Company, whose output is now at the rate of 350,000 tons per annum, and is largely used for steam purposes on Canadian railways, steamboats, etc. The coal is also adapted for domestic purposes, and its coke is extensively used at the Londonderry iron works.

The following analyses show the quality of the coal of this district:—

CONTENTS.	North Seam.	Main Seam.	South Seam.
Moisture	1-625	78	1-39
Vol. Comb. Matt.	28-672	31-32	31-32
Fixed Carbon	65-431	62-54	61-58
Ash	4-272	5-34	5-79
Sulphur	783	1-38	80
Evaporative power	8-99	.....	8-46

The extent of country underlain by the productive measures is not yet clearly known, but has been estimated at 300 square miles. The district is intersected by the Intercolonial Railway, and a branch railway runs from the Springhill collieries to Parrsboro, on the Bay of Fundy, where extensive shipping docks are being constructed.

The principal collieries now in operation, and the respective output of each for 1885, are as follows:

Name of Colliery.	Situation.	Output for 1885.
		Tons.
Chignecto	Cumberland County.	6,084
Joggins	" ..	17,664
Minudie	" ..	7,702
Springhill	" ..	335,055
Acadia	Pictou County	98,150
Albion	" ..	129,195
Intercolonial	" ..	109,139
Vale	" ..	76,125
Sydney	Cape Breton County.	124,274
Victoria	" ..	47,614
Liugan	" ..	21,761
Reserve	" ..	83,276
International	" ..	67,959
Bridgeport	" ..	13,178
Little Glace Bay	" ..	39,400
Caledonia	" ..	58,859
Block House	" ..	11,075
Gowrie	" ..	74,414
Unimportant collieries		31,281
Total		1,352,205

The sales of Nova Scotia coal for 1885 were as follows:—

	Tons.
Provinces of Nova Scotia	444,652
New Brunswick	148,634
Newfoundland	74,322
Prince Edward Island	52,770
Quebec	493,917
West Indies	5,732
United States	34,483
Total (long tons)	1,254,510

(To be Continued.)

Improved Hoisting Engines.

We have received the most recently published catalogue of the Lidgerwood Manufacturing Company, whose extensive works are in Brooklyn, N.Y., and offices and salesrooms in New York city and Boston. This company are manufacturers of the most modern high-speed hoisting engines, and boilers, for marine service, contractors, miners and railway corporations. A great variety of their engines are illustrated by beautifully finished engravings, and are fully described in the catalogue. All the work of this company is done on the *duplicate part system*, enabling them to fill orders promptly for duplicate parts, which are made to gauge and will fit without trouble. Their system for testing is very complete, and all engines are run with steam on before being shipped, and boilers are thoroughly tested by steam, as well as by the usual hydrostatic test. As will be seen by their advertisement in another column, this company give special attention to engines for mining purposes, and will furnish estimates, &c., on application.

Gold Mining in British Columbia.

The official annual report of the Minister of Mines for 1885 shows a falling off in the year's production of \$22,427 from that of 1884, and the statistics show a large increase in the number of miners engaged in gold mining in some of the gold districts of the province. The total amount of gold known to have been exported by banks, etc., amounted to \$594,782 for the year, and the amount estimated to have been carried away in private hands \$118,956,

making a total yield of \$713,738, as against \$736,165 for 1884. The number of miners employed during the year was 2,902 and the average yearly earnings per man was \$246, as against 1,858 miners employed in 1884 with an average yearly earning of \$396 per man. The decrease in the average yearly earnings is accounted for by the rush to Granite Creek towards the close of the mining season, and by an increased number of Chinamen rocking during the autumn months on the bars of the Fraser (already worked and re-worked) with but little return for their labour. The statistics show that the increase in the number of miners occurred chiefly in the Yale district, where towards the close of the season there were 998 at work, and the year's yield of gold was only \$146,500. This had the effect of reducing the general average earning for the year, but as nearly nine-tenths of the miners did not reach the diggings in the district until shortly before the season closed, it is reasonable to suppose that next year the total yield from the Yale district will be largely in excess of these figures, and that the general average earning for the province will be increased in like proportion.

The Gold Commissioner of Cariboo states that in his district another year passed without any material development of the quartz ledges, and with the exception of the efforts put forth by the Quesnelle Quartz Mining Company, nothing had been attempted in this direction. The Quesnelle company were, he states, making a most laudable attempt to prove the value of their mine at Hixon Creek and had purchased an engine and other machinery at San Francisco and engaged the services of experienced Californian quartz miners. The Commissioner estimates the gold yield of the district for 1885 to have been \$347,700, and adds that Cariboo has not as yet derived any benefit from railway construction. Freight rates are still high, and Cariboo prices have undergone but little change during the year.

GRANITE CREEK.

This stream, to which there has been a great rush, is a tributary of the Tulameen, or north fork of the Similkameen, and falls into that river on its right bank, about twelve miles above its junction with the South Similkameen at Princeton—better known as the "Vermillion Forks," and "Allison's." About five miles from its mouth Granite Creek is joined by a small creek from the south-west, which point is called the "Forks." With the exception of a few hundred yards at its mouth, Granite Creek runs from the forks downwards in a deep V shaped gorge, through which the yearly freshet, evidently of great volume, has washed everything except the gold and some gravel—in fact this portion of the creek has been ground sluiced by nature. Mr. T. Elwyn, Deputy Provincial Secretary, visited Granite Creek last autumn, and reports that from near its mouth to a point something over half a mile below the "Forks," a distance of about four miles, no claim which has been tested on either side of the bed of the stream has failed to yield good returns, the ground for that distance averaging over an ounce a day to the hand. On 31st October, on lower Granite Creek, there were 62 companies owning creek claims, averaging probably 300 feet to the company, who were working. Of these, 34 were taking out gold and 28 either preparing to do so or prospecting. The gold admitted to have been taken out by the several white and Chinese companies, from 5th July to 31st October, 1885, amounted to \$90,000, which, considering the great loss of time caused by the freshet, and the difficulty of obtaining lumber

for sluice-boxes, is a creditable showing. On the morning of November 1st one company washed up \$750, the result of the labour of eight men for thirty hours. Mr. Elwyn believes that the discoveries on Granite Creek will lead to the opening up of an extensive gold field which will be of more benefit to the province than any yet discovered, except, perhaps, Cariboo. He states that he was particularly impressed with the fact that those who were warmest in praise of these new diggings were amongst the most experienced miners who had gone into the district.

CANADA'S IRON TRADE.

We are indebted to the publishers, Messrs. Dawson Bros., of Montreal, for a copy of a very interesting work entitled "The Manufacture, Consumption and Production of Iron, Steel and Coal in the Dominion of Canada, with some notes on the manufacture of iron, and on the iron trade, in other countries." Mr. James Herbert Bartlett, Associate Member of the Institute of Civil Engineers, &c., &c., &c., the author of this work, is deserving of much praise for the careful manner in which he has compiled the information it contains. The author's aim has been to bring into prominent notice the importance to the Dominion of Canada of the manufacture of iron within her borders, and to show how this industry would benefit the country and develop her resources. The subject suggests many important questions which are ably dealt with by the author, whose researches in the direction of statistical detail have been of an exhaustive character, and it is evident no pains have been spared in tabulating the same in an intelligent and comprehensive manner. Mr. Bartlett appears to appreciate the fact that reliable, practical information in connection with the manufacture of iron in Canada has been much needed, and, in treating the subject from a commercial rather than from a scientific point of view, he points out the conditions under which other nations have succeeded and gives the value of the manufactured articles imported into Canada and the quantities consumed.

Statistics of the imports and exports of iron and the manufactures thereof have been compiled from the Dominion Trade and Navigation Returns, and show that the value of the imports, including duty paid thereon, for the seventeen years since Confederation—1869-1884, inclusive—has reached the enormous sum of \$252,638,613.44, or an average of about \$14,860,000 a year. The classification and tabulation of statistics in connection with the various branches of the iron and steel industries represent a remarkable amount of patience and perseverance on the part of the author and have been so arranged by him as to be easily available for reference. As a statistical work the book will prove very valuable, and besides being replete with interesting and useful information it will undoubtedly draw attention to the very important subjects on which it treats. The book reflects great credit on the author and we feel ourselves much indebted to Mr. Bartlett for having put into our hands so much information in so concise a form.

In the Smithsonian Institution at Washington is the small nugget of gold, a little larger than a pea, that first met the eyes of James Marshall in the sawmill raceway at Sacramento, and was the beginning of those discoveries in California that have added nearly \$1,500,000,000 in gold to the world's stock of the precious metals.

CANADA —AT THE— COLONIAL & INDIAN EXHIBITION. Her Natural History, Mineral & Fisheries Exhibit.

In the west transept of the exhibition building at South Kensington, will be found the collection of natural history specimens, which must prove to visitors one of the leading features of the Canadian display. The Canadian Geological and Natural History Survey has, in itself, enough to form a separate display, though supplementary to it are the Hudson's Bay, the Renfrew and Hubbard collections, thus representing adequately the whole game of the Dominion. The centre of this west transept is, correspondingly with the east transept, occupied by a commanding trophy of game and game birds, and even those of the migratory class, arranged with no little tact and judgment. From this point the west gallery is reached. *Here the mineral resources of Canada are set out in full array. So rapid has been the growth of the mining industries of the Dominion during the past decade, that the 549 specimens exhibited at Philadelphia have increased to 725 at South Kensington, contributions coming in large numbers and great variety from the mines of Nova Scotia, New Brunswick, Quebec, Ontario, the North-West and British Columbia, and including many specimens of considerable value shown in the process of various dressings from the simple ore. The practical results likely to follow from this mineral exhibit are considerable. One may, perhaps, be not too sanguine in anticipating that so powerful a witness to Canada's vast and rich mineral deposits will even do much to overcome the prejudice of English capitalists against embarking in enterprise in this direction—a prejudice not altogether unnatural, when one remembers the hands into which some Canadian mining ventures have fallen in recent years. Intimate knowledge, such as the present exhibit will encourage, must, however, bring about a different state of things.* In the west gallery the shafting provided will be used for the display of machinery in motion—always an interesting feature to visitors. Here the skilfully-designed agricultural and general products of the Birmingham of Eastern Canada will undoubtedly be the object of much curiosity to English mechanics, agriculturalists and manufacturers. Beyond the west gallery is the west arcade, in which Canada has been provided with some 2,000 feet for the display of the products of her fisheries. The exhibit made in London three years ago is here brought into requisition, with, of course, large additions of stuffed and preserved specimens of fishes and marine invertebrata, as well as schooners, models of salmon hatcheries, fishing tackle and all utensils for sea and lake fishing. The National Fish Culture Association is taking charge of the oval until a fitting receptacle is ready for it. An interesting feature of this part of the Canadian display will be the intended shipment of fish periodically, from Canadian waters, under the refrigerator process, not for sale, but to demonstrate the practicability of direct shipments of the fish of Ontario, Manitoba and British Columbia by direct Canadian rail to the Atlantic port, and thence to England.—*Canadian Gazette, London, Eng.*

The Drum Lamont mine of Montana distinguished itself during January by the largest production on record. Sixty stamps working thirty days crushed 3,456 tons, yielding \$100,831.19.

Notes on the Progress of Mining and Metallurgy in Europe.

BY E. J. BALL, PH. D.

(Assistant in Metallurgy at the Normal School of Science and Royal School of Mines, London.)

Written specially for the Canadian Mining Review.

The action of coal-dust in colliery explosions continues to excite considerable discussion, notwithstanding the attention it has already received, and R. Schneider, in remarking on the results of some experiments made at the Segen-Gottes Colliery, Moravia, which showed in direct opposition to those obtained in Dr. Hilt's experiments with dust from the same colliery in the Neunkirchen level—that free-lying dynamite would always explode the Segen-Gottes dust—states that Dr. Hilt suggested that this was probably due to the detonators that were used being too weak, and to their consequently not exploding the dynamite properly, and that it would be therefore well to repeat the experiments with the triple force detonators manufactured by A. Barnhardt, of Brunswick. This was done, but the results were the same as before, the dust being exploded every time without any gas being present. Schneider is consequently of opinion that the difference in the results of the experiments made at the colliery and at Neunkirchen were due to the excessively fiery nature of the dust, which, he considers, must either have been damp or not sufficiently powdered when used in the trials at Neunkirchen. The general conclusions derived from his experiments have, however, tended to confirm those obtained by Dr. Hilt, and attention is drawn to the fact that in all cases where dry and dusty fiery pits are worked the present method of shot firing cannot possibly be practised without danger.

In referring to the investigation recently made at the Gabriel Colliery in the Karwin district, Austria, on the influence of the changes in barometric pressure on the escape of fire-damp, the results of which confirmed those obtained in previous experiments, showing that the danger increased with a falling barometer, J. Mayer remarks that although this may be true in some respects, the chief danger lies in accumulations of coal-dust.

J. Haller has described the method of treatment adopted in working the brown-coal deposit at Liescha, Austria, which is 25 feet thick, and he states that the one originally employed—stopping—caused the ventilation to be so bad, and the temperature so high, that it was abandoned, and a modified post and stall work introduced in its stead. The result was that not only was the ventilation greatly improved, but the work done per man and per shift increased by 39 per cent. The drawing engines in the pit were, until two years ago, worked by steam brought down to them in pipes; this has now been replaced by compressed air with very satisfactory results. The wooden timberings, which had to withstand considerable pressure, and, in consequence, to be frequently renewed at certain places, has been replaced by steel rails, and although their first cost is greatly in excess of that of the wood, they have proved in the long run much more economical.

With regard to the sinking of shafts, J. H. Poetsch has taken out additional patents in Germany, and elsewhere, in which he proposes to employ the pipes he has used in freezing the quicksand through which it was desired to sink the shaft, after it has been sunk and the ground thawed again, either in connection with pumps to partially remove the water or as supports by

filling them with cement, or by otherwise strengthening them.

H. Thomas, of the French Geological Survey, discusses in the *Génie Civil*, the size of the pillars which should be left to support the roof in underground workings, and he gives some figures relating to building stone, calculated from the resistance offered by the materials to crushing stress.

The mineral wealth of Spain is exceedingly great, and its natural advantages are such, that should the country ever succeed in obtaining a settled form of government, its mineral resources are sure to receive considerable attention, and this tends to endow the description by R. A. de Yarza of the mineral deposits of the Province of Guipúzcoa (*Revista Minera of Metalúrgica*, 1886, Jan. 17 and Jan. 24) with considerable interest. The ores found are chiefly those of lead, zinc and iron, as although copper ore has been found it has only been in small quantities, and up to the present is of no importance. No coal beds have been discovered, but some lignite deposits exist in the cretaceous rocks. The galena occurs principally in lodes in palæozoic measures, those occurring in the cretaceous being of far less importance. Zinc blende is also found both in the palæozoic and cretaceous rocks, and calamine also occurs in considerable quantities. Iron ore deposits are abundant, and would be of great importance were they not so close to those of Biscaya, with which it will be difficult for them to compete successfully. The ores, which are of good quality, occur partly as contact deposits between granite and palæozoic rocks, partly in the palæozoic rocks themselves, and occasionally also in the cretaceous.

H. Tweddle describes in *Engineering* the petroleum regions of Europe and Asia, and he states that they extend from the north-western extremity of Great Britain diagonally across Europe, the Crimea, and the Caucasus, and that they terminate in Central Asia. This zone embraces nearly all England and Scotland south of the Grampians, Hanover, Bohemia, Galicia, Moldavia, Roumania, Transylvania and Hungary, the Crimea, the Caucasus chain, and in the trans-Caspian regions, the Island of Tchelenken, Krasnovodsk, the Neft Gora, the Heri Rud, and Tashkent, the last explored petroleum region in Central Asia. He remarks on the great similarity of the geological measures where petroleum is known principally to exist, viz., in the cretaceous, though it is found in every formation from the granite and volcanic rocks to the highest and most recent deposits of the Aral-Caspian, and he considers that the zone may fairly be regarded as more or less similar to the petroleum fields of North America. These, it may be mentioned, have been recently described at considerable length by C. Zincken, of Leipzig, Germany.

Turning from mining to the kindred subject metallurgy, the iron and steel industry first claims attention. The chief object of discussion at present is as to the relative advantages of large and small Bessemer converters, and it would seem to be the general opinion, that however advantageous small converters may be under certain conditions, yet, that under ordinary circumstances, it will be impossible for them to compete successfully with large ones.

The basic process is making rapid progress on the continent of Europe, but the progress is somewhat slower in Great Britain, where the abundance of pure ore renders it unnecessary to work deposits of ore which are of lesser purity. Magnesite is coming into considerable use in the manufacture of basic bricks.

Arrangements for the collection of the waste products from coke ovens are gradually being

made use of in the case of those already constructed, and a considerable number of the more modern forms of ovens have been lately erected, the tendency being to employ almost solely horizontal ovens of the modified Coppée type. Compressing the coal by means of rollers after charging, has, it is stated, enabled, in the case of certain German coal, a much better coke to be produced than would otherwise have resulted. It appears to be generally considered that the collection of the ammonia from the waste gases of blast furnaces using coke as fuel is not likely to prove very profitable.

The Manhès process for the Bessemerizing of copper regulus is assuming considerable importance, and the latest form of converter proposed by Manhès, and exhibited by him at the Antwerp Exhibition, resembles in shape the boiler of a horizontal engine. It is cylindrical, and rests on a truck. The tuyère box runs along the side, and holes in its back facing each tuyère permit of rods being inserted through them to keep the nozzles free. The converter is revolved by means of a tooth-wheel and gearing, and the throat is in the centre of the upper portion.

Electrolytic processes are also making considerable advance, though their progress has not been so rapid as was at one time anticipated, the chief reason being that the comparative abundance of fuel and of skilled labor renders it impossible for processes which rely chiefly on the saving effected in these respects at the expense of time to compete with others which enable the capital invested to be turned over far more rapidly. In the case of copper, too, although electrolysis enables the gold and silver present in the material treated to be collected, and a metal to be produced which commands a higher price in the market, still the great majority of the ores contain such small percentages of the precious metals that they, and the higher value of the copper produced, would not compensate for the loss of interest on the capital invested. In countries, however, where fuel is either scarce or costly, and labor expensive and unskilled, electrolytic processes certainly deserve a far greater consideration than they usually receive, more especially in such places where water-power can be made use of, or where the materials to be treated contain an appreciable amount of the precious metals. Electrolytic plants for the treatment of cupriferous materials are, however, being built in various parts of Europe. There are several in the United Kingdom, and they chiefly use metallic anodes, concentrating the silver and gold in "bottoms," which are afterwards cast into the desired shape; anodes of regulus have also been tried, but, I believe, without marked success, although works have recently been erected at Stolberg, in Austria, and in the neighborhood of Genoa, where regulus alone is intended to be used.

Scarcely any attention has been paid in Europe to the employment of electrolysis in the case of lead, but attention is beginning to be directed to its use in the case of zinc ores, though I am unacquainted with any works employing as yet such a process on a commercial scale.

Very many different types of dynamos are in use at works, and in choosing one it seems customary to select that which converts the greatest percentage of energy into electricity; but, however correct this may be from the point of view of an electrician, from that of a metallurgist this perfection of the machine should be by no means the sole consideration, as simplicity of construction and the ease with which repairs can be carried out should receive careful consideration, more especially in such cases where the position of the works will render it impossible

to obtain skilled assistance in case of a breakdown, and where the machine will have to be entrusted to persons who, it may be, have had no experience in its management, and who are wanting theoretical knowledge. Of course no machine should be chosen unless it gave fair results, but I lay stress on the advisability of it being as simple as possible in construction, as this is very frequently overlooked, and my attention was drawn to the subject in the Works where I studied the process.

Two or three adoptions of electricity to the treatment of gold ores have been more or less discussed of late, but opinion is still very much divided as to their merits.

Numerous so-called improved forms of amalgamators, &c., have been proposed, but most appear worthless, and the great majority of the others have scarcely advanced beyond the patent stage.

CORRESPONDENCE.

MINING RECORDS.

Editor Canadian Mining Review.

Experience in the old world may be of use in the new. In Ireland, the earliest written record I can find is one A. M. 3656, and since then they are few and far between. There are, however, other records, in the old attics and other waste heaps; but who were the miners? and when were they worked? or what they did, underground it is impossible to say. The latter is even the case with works carried on within the present century, not a record having been kept except in a few cases, and if an adventurer starts a mine in or near an old sett, he has to take chances, while after he has come on a good lode and made all preparations for working a mine, he may find that the "old men" have been before him and cut out all "the riches." This has been the case over and over again in our modern mining operations; "old men's workings" have spoiled many a good mine. Yet what can be done? Out of the thousands of mines that, from time to time, have been in operation in Ireland, I believe there are not the records of fifty, if of half that number.

I read with great interest the evidence given before the Enquiry held some times since in Ottawa, and had a fellow feeling with the geologists examined, as no matter how zealous, anxious or painstaking a geologist may be, unless he has the power to say—stand and deliver! he cannot get records from unwilling hands.

At the present time, according to the new act, mining agents must annually return records of their working—but not of old workings which are those of most importance in connection with further research. During the last 30 years or more, I have been endeavouring to get copies of these old plans and sections, and in no important mine have I perfectly succeeded. In some few small workings I was able to do so, but invariably in the large ones I was unsuccessful. In most cases the mines had gone through different hands, and at each successive sale of the property, the sellers had either kept back or destroyed all records, except those that they considered advantageous to themselves; consequently to get full plans and sections would necessitate expensive surveys that the company or I could not undertake—or the agent or company might be unwilling to allow the extent of the works to be made public—they might let you look at the plans and sections and say you might copy them, but invariably I found it hard to accomplish the latter,

and never without an amount of tact. When an agent pretends to be willing and at the same time intends to prevent you getting copies of his plans, it takes a great deal of stratagem to circumvent him.

These are my experiences. Some agents cannot give statistics unless he went to great expense in new surveys, while others will not, as they are afraid it might possibly be hereafter detrimental to their interest. To get statistics, therefore, it is necessary to make it compulsory that plans and sections of all mining operations should be furnished to an authorized official, as otherwise no one, no matter how energetic or painstaking, can procure them. The great losses due to unrecorded mines in the "old countries," British and foreign, ought to be a lesson to the new, and teach them to "take time by the forelock." Let them have properly appointed officers whose duty it is to record all mining operations, and to whom all statistics of such operations must be given. In a new country this could be easily managed by insisting on all mining adventures being registered. The register fee might or rather ought to be merely nominal, but coupled with it should be an obligation to furnish, at specified times, full accounts of all mining operations, the neglect of complying with the latter subjecting them to severe penalties. Such a law would not prevent individual research, while it would protect subsequent adventures and the losses so often due to bogus companies.

J. HENRY KINAHAN.

NOVA SCOTIA GOLD FIELDS.

PAY-STREAKS.

Editor Canadian Mining Review.

Not having had the advantages of a personal knowledge of the "Pay-Streaks," I was led, from the descriptions that I had seen, to suppose they were the filling in of vertical shrinkage fissures. Mr. Gilpin's very instructive description of them in March number of the REVIEW, however, seems to suggest that they are the shrinkage fissures on the arch of an anticlinal curve, dipping or "hading" more or less at a high angle at the line of axis of that curve; and these in each district in accordance with the strike of the line of axis, occur in local systems having similar strikes and underlie, the strikes being parallel to the line of axis. If this is the case the fissure ought invariably to decrease in width gradually in depth; the decrease in width being more gradual the more perpendicular the streak—that is, the less the angle between the dip of the streak and the vertical of the axis of the curve, the less the variations in the width of the fissure—that is, the fissures at or near the crown of the arch of the curve, ought to be more uniform in width as followed down than if away from the line of the crown of the arch; the farther from the crown the greater the opening at the surface. This can be seen in sharply folded strata, the quartz veins filling such shrinkage fissures when nearly perpendicular thinning very gradually, while, if underlying at lower angles, the change in their widths is much more rapid. If "Pay-Streaks," are the filling in of fissures of this class they must die out in depth and finally end. There is, however, the converse to this: What are the shrinkage fissures in the sides of a synclinal curve? Ought they to open in depth? Is the tension in the strata forming the anticlinal curve similar to the tension in the strata forming the synclinal curve? Of the latter, however,

I cannot speak, as my experience has never furnished an example.

J. HENRY KINAHAN.

Office of

The Geological Survey of Ireland,
Dublin, Ireland.

NORTH SHORE MINES.

LAKE SUPERIOR DISTRICT.

Editor Canadian Mining Review,

SIR,—Seeing in your valuable paper for frequent accounts of the tests at the silver mines in this district, also at the Huronian Mine in the gold region, during the past year, I think a word would not be out of place respecting some of the silver mines upon this shore which were worked more or less twelve years ago.

I speak as a miner who worked in most of the mines mentioned below, and can vouch for the facts in each case.

I will first take the "Silver Harbour" mine. The main shaft at this mine was sunk 120 feet, and another some 30 feet. There was a large amount of black sulphide of silver and silver ore taken out, sufficient, if the mine had been properly handled, to pay working expenses; and when the work was stopped the mine looked well, so much so that an American gentleman would have worked it right along if he could have procured the property on reasonable terms and without restrictions. The company who worked this mine literally squandered their money by erecting a splendid building, which cost some fabulous sum, and was wholly unnecessary; they also spent a large amount for engines and machinery for stamp-mill, which were never used and subsequently went to ruin, instead of opening up and testing their mine at the outset—which has never been done. It is my belief that had the company been mining men, or their manager a practical mining man, this mine would be working and paying large dividends at the present day.

I will next take the "3 A" mine, which is upon the adjoining location to "Silver Harbour," but a distinct vein. The main shaft is down 140 feet, and another about 40 feet. There was a large amount of native silver and nickel silver taken out at this mine; certainly some of the largest specimens of native silver ever taken out on the North Shore were from "3 A," and there was a very fair show of silver when work was suspended. "3 A" may be classed with "Silver Harbour" as regards mismanagement, for there was sufficient silver taken out to pay all expenses and leave a handsome balance had it been properly taken care of.

Should the owners of either "Silver Harbour" or "3 A" mines place their properties upon the market as assessable stock, I am assured the people in this district would readily take them up.

At "Thunder Bay" mine there was only one shaft sunk, about 100 feet in depth, from which a large amount of native silver was taken out, sufficient to pay working expenses if the mine had been worked economically; but here again the company incurred the expense of valuable machinery and stamp-mill, which were afterwards left to ruin, before proving their mine in any way. It is my opinion that should a strong company take hold of this mine and have it thoroughly tested it would turn out well.

"Jarvis Island" was worked and tested to a depth of 130 feet, and found to carry some native silver and silver ore, and when abandoned there was a good show of silver. The

owner of this property intends, I believe, to start work again this spring.

"Spar Island" has not been worked for some 40 years, though it is said to be one of the best mines on this shore. The main vein carries grey copper ore and native silver, a large amount of each, and is 12 feet wide; there is also another vein four feet wide. Some few years ago a gentleman in Port Arthur, who has the control of this estate, had some very fine specimens taken out. The vein shows equally good upon the mainland.

The only mine which has in any sense been tested in this district is "The Duncan." The main shaft was sunk 900 feet, and another shaft 150 feet; the longest drift is 400 feet. The company was a good one, the best upon this shore to the present day, and for 700 feet along vein from main shaft the mine was very fairly tested. They obtained a large quantity of native silver for about 400 feet upon surface, and considerable at a depth of 100 feet, and the core from diamond drill usually assayed silver wherever tested upon vein. The testing upon this 700 feet of the main vein was considerable, but the company did no work or exploring except upon this one vein, although there are several others upon the location all carrying good mineral. It has been reported that a large deposit of silver has recently been discovered upon the location by one of the men who previously worked at this mine.

All the above mines are easy of access, either water, road or rail facilities being excellent, and there are numerous other locations around this district which could be profitably worked under efficient and economical management.

There is no doubt that the owners of the properties in the new silver district and gold region have taken warning from the previous experiences of mining upon this shore and have gone to no unnecessary expense until assured of an adequate supply of mineral to pay for expensive buildings and machinery; but as I see in your paper that capital is seeking investment in mines and mineral lands, I am sure it would amply repay the capitalist to visit and take note of the mines above mentioned, in addition to the new mines which are being opened up all around us.

Yours truly,
"A MINER."

Port Arthur,
Lake Superior.

FOSSIL HUMAN FOOTPRINTS.—Herr H. E. Low has obtained and forwarded to the Imperial Museum in Vienna twelve large stone slabs bearing the foot-prints discovered last year in the solid rock in the quarry over Lake Managua, in the territory of Nicaragua. The interest was increased by the statement that those foot-prints had been overlain by eleven different layers of stone, extending to a depth of four meters, and indicating an antiquity for our race quite transcending all conjectures hitherto hazarded. They are about three quarters of a meter square. They can now be inspected by European geologists. The foot-prints are sunk into the stone to a depth of from eight to ten centimeters. The stone itself is a porous tufa, and the superincumbent layers, which had been removed for building purposes, were all of a more or less solid volcanic conglomerate. The foot-prints are very conspicuous, and seem to be those of three distinct persons, one of whom was a child.

The proprietor of Montvale Springs in Blomet County, Tenn., has sunk a shaft ninety feet deep on his property and claims to have found a rich vein of silver ore.



All correspondence under this head, and scientific exchanges, must be addressed to the Science Editor, Canadian Mining Review.

Mineralogy of Pliny.

To a student who is following a course of science and literature, many questions of strange interest present themselves. In his scientific studies, on the one hand he becomes aware of the latest discoveries of the day; he is perfectly acquainted with the physical structure of the globe, and seems as conversant with what is written in the records of nature, as the book-worm is with the productions of his favorite author. On the other hand, his literary pursuits transport him into the far past, into the ages of antiquity, and bring before him the simplicity of men of by-gone days, with their odd superstitions and quaint beliefs. He cannot fail to remark the striking contrast between the opinions of the most intelligent and learned of the ancients, and those of the mere student of science of our day.

To exemplify this general idea, we may consider a particular case. See what difference there exists between the knowledge which we have to-day of mineralogy and that which the ancients possessed. A mineralogist who has been so happy as to fall in with Pliny's treatise of mineralogy cannot fail to be amused. During the days when Pliny flourished, a scientist was far different from what he is at present. Whatever was known at Pliny's time, Pliny knew; and whatever Pliny knew is to be found in his admirable works. By reading this author, therefore, we can have an adequate knowledge of what the ancients knew, and in Pliny we can study the light in which mineralogy was once regarded.

Five lengthy books of his "Natural History" are devoted to minerals. But, gentle reader, were you to peruse a work on moral philosophy or a volume of rhetoric, you would then know nearly as much mineralogy as you would after the perusal of Pliny's dissertations.

What, indeed, are these five books if not mere rhetorical dissertations, replete with moral reflections? Admirably written, indeed, his works cannot fail to interest. He has paid great attention to his style and choice of words. He discourses on the ill effects of gold and silver and of the precious stones, and does not hesitate to denounce them as the bane of Roman society. He is loud in his lamentations because of the introduction of these "articles of luxury," the cause of effeminacy, the corrupter of morals. This is his unceasing strain while he is speaking of gold, and occasionally he is strong in his invectives against the unknown inventor of such and such a perfidy.

In the first of his five books he treats of metals, beginning with gold. After a severe criticism of Roman luxury, we are presented with a complete history of rings, then of crowns, and lastly of gold coin, the invention of which "was an enormous crime against humanity." A slight allusion to the ductibility of gold and the manner of procuring this metal is what comes nearest to the subject of mineralogy. Read what he says about silver, and you have a good idea of ancient mirrors, vases, plates and statues of silver. Read his second book, on copper, and you have a perfect knowledge of bronze statues and chandeliers. We must not

omit medicine; this is a strong point in Pliny's works. He delights in dwelling on the medicinal properties of the metals, most of which were used for that purpose in his time. In fact, iron and lead are scarcely treated under any other head.

The third book is an excellent treatise on painting; the fourth is devoted to marble sculpture, while the fifth treats of precious stones. This is by far the most useful part of Pliny's work. He displays in it a wonderfully extensive knowledge of the gems which had become at that time very extensively used in Roman society. It is needless to state that, in a strictly mineralogical sense, his vast erudition fails to give even a clue to the science of gems. His classification is entirely artificial. Gems which, for instance, are varieties of quartz are given as totally different species; whilst others, widely different in composition and crystallographic characters, are brought together with regard solely to their external properties. But we are inclined to be indulgent towards the old Roman *savant* when we consider the amount of invaluable information he imparts and the graceful diction he employs, and we willingly admit that science would soon become popular if all scientists could and would imitate Pliny's attractive style.

W. A. H.

Aluminum.

"The metal of the future" is the designation given to aluminum by the President of the Scranton Board of Trade, in an address before that body. Possessing all the good qualities of iron without its weakness, it will, he thinks, in time totally replace that, at present, most useful of metals. Aluminum is now principally used in alloys. But its resistance to oxidation eminently fits it for household utensils, its lightness compared with its bulk makes it very suitable for architectural purposes, and its use in building steamships, and furnishing railways with their rolling stock, would revolutionize present rates of travel. It is a much better conductor than iron, and would replace that metal in telegraph wires; knives, swords and axes made of alloys of aluminum receive a much better temper than the finest steel. The great objection to the use of this metal, which is so abundantly diffused, has hitherto been the cost of reducing it from its ores. But President Price asserts that the price of aluminum is now only \$15 a pound, which is 50% less than it was thirty years ago; and a company in Cleveland claims that within the past year, by a new process, they have made it possible to reduce the price to \$4 a pound. If aluminum really possesses all these qualities in such a high degree, we may indeed prepare to witness new achievements, which will throw those already accomplished into the shade.

D. PHALEN.

Germanium.

Prof. Clemens Winkler, writing in a recent number of *Nature*, announces the discovery of a new element by himself. In the summer of 1885 a new mineral was discovered at Himmelsfurst, near Freiberg, in Saxony. This mineral was a rich silver ore, and received the name of *argyrodite*. Before the blow-pipe it yielded sulphur, silver, and a little mercury, in the following percentage: mercury 0.21 per cent., silver 73 to 75 per cent., sulphur 17 to 18 per cent. A small quantity of iron and traces of arsenic were also present. But there was always 6 or 7 per cent. un-

accounted for. Prof. Winkler claims to have discovered that this portion of the mineral contains a new element, which, in honor of his country, he has named *Germanium*. Germanium resembles antimony in its properties. The presence of arsenic and antimony in the minerals accompanying argyrodite made the discovery of the new element very difficult. On heating argyrodite in a current of hydrogen a black, crystalline and moderately volatile sublimate is formed, consisting of the sulphides of germanium and mercury. Germanium sulphide dissolves in ammonium sulphide and is precipitated in a pure state by hydrochloric acid. On heating germanium sulphide in a current of air, or warming it with nitric acid, a white oxide, non-volatile at a red heat, is produced. This oxide is readily reduced by hydrogen, but the reduction of the sulphide is more difficult on account of its volatility. Germanium, like arsenic, has a grey colour, and a moderate lustre. It is volatile only at a full red heat, but much less so than antimony. Its crystals could not be mistaken for those of the latter metal. The atomic weight of germanium, when ascertained, will show whether this element is to occupy the vacant place in the periodic system between antimony and bismuth.



COAL GAS.—It has been lately discovered that the heat value of coal gas has been rated too high, up to the present. A French chemist has ascertained that the real heat value is 15 per cent. below what it was thought to be, or 5,200 instead of 6,000 calories per cubic meter at 0°.

TIN.—Some of the supposed causes of the disintegration of tin are discussed in the *Mining and Scientific Press*. The idea of a dimorphesin is suggested by the fact that the disaggregated tin is of a lesser specific gravity than was the tin in its former state. The presence of mercury in the metal is another possible cause of its disintegration.

GEMS.—The *Jewelers' Journal* gives the following chemical directions for making artificial gems. To make the *sapphire*, heat 4 oz. of aluminum oxide and 4 oz. of red lead to a red heat. When smelted add 10 grs. bichromate of potassium and 17 grs. cobalt oxide. Stir up well and keep cool. The *ruby* is produced by the following process: Heat 4 oz. of aluminum oxide and 4 oz. of red lead to the smelting point, and add from 7 to 16 grs. of potassium bichromate. For the *emerald*, to the same quantity of oxide of aluminum and red lead, add from 8 to 12 grains of sodium uranite, and treat as above. Parisian or Alaska *diamonds* are made by heating 65 per cent. of pulverized crystal quartz, 20 per cent. of red lead, 8 per cent. of pure carbonate of potash, 5 per cent. of boric acid, and 2 per cent. of white arsenic. The brilliancy of the diamonds depends upon the purity of the red lead and of the carbonate of potash.

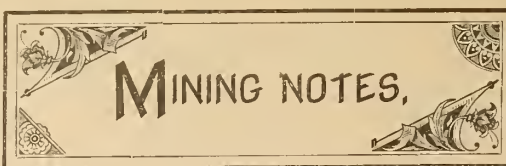
COPPER AND NITROGEN.—M. Blendlot, of the French Academy of Sciences, has observed a curious phenomenon with respect to the action of nitrogen on copper. A disk of platinum and a disk of copper, 0.03 meter in diameter, were placed 3 or 4 millimeters apart, under a bell jar of porcelain open below, and were fixed vertically in front of each other by means of platinum stands. The whole apparatus was then heated for three hours by a gas furnace.

At the end of that time, although there had been no electric current, the face of the platinum disk was found blackened with a deposit containing copper and platinum. In short, the copper had crossed over to the platinum. By repeating the experiment in a different gas, M. Blendlot ascertained that the nitrogen of the air had been the agent of the transfer by combining with the copper, which it afterwards deposited on the platinum.

MELDOMETER.—Prof. Joly, of Trinity College, Dublin, has described, in *Nature*, an apparatus contrived by himself, by which he can determine or compose the melting points of minerals, and their behaviour at high temperatures, either alone or in the presence of reagents. To this apparatus, which is to be attached to a mineralogical microscope, he gives the name of meldometer. He says, "As I now use it, it consists of a narrow ribbon of platinum (2 mm. wide), arranged to traverse the field of the microscope. The ribbon, clamped in two brass clamps so as to be readily removable, passes bridgewise over a little scooped-out hollow in a disk of ebony (4 cm. diam). The clamps also take wires from a battery (3 grooves cells), and are adjustable; the resistance being placed in circuit, the strip can be raised in temperature to the melting point of platinum." The platinum strip is placed in the field of a 1" objective, and a wedge of tainted glass is used in photometrically estimating the temperatures, by extinguishing the field. Approximate estimations of the temperature are made in terms of the resistance of the platinum strip. These observations may be compared with the readings on the wedge, which are then used for ready determinations. The mineral is placed in small fragments near the centre of the platinum strip, and the current increased till the melting point is apparent. By means of this apparatus, Prof. Joly has melted beryl, orthoclase, and quartz, and discovered for the first time that the last fuses below the melting point of platinum.

BEAUTIFUL MARBLES IN ALGIERS.—The re-discovery of the ancient quarries where the beautiful antique marbles were obtained is interesting. An extensive quarry, covering two thousand acres, has been quite recently discovered in the province of Oran, near the Mediterranean coast, in Algiers. The deposit has been obtained by an Italian who has constructed roads and begun operations. The deposit contains giallo antico, breccia, and cipoline, besides black and white marble. These fine colored stones can be laid on the wharf at Oran for about one dollar a cubic foot. The beautiful yellow marble, giallo antico, has, until this late re-discovery, been unknown, save by the fragments found in Roman ruins two or three years ago.

AN IMPORTANT EXPERIMENT.—The mining public will be much interested in the results obtained from the experiments which are to be made by means of a dynamo to be set up on the Truckee river in Nevada to transmit thence the whole motive power of that stream—furnished by a Laffel turbine, with a full head of water, with 100 feet fall—to a receiving dynamo at Virginia City. Those engaged in this operation claim that in this way a motive power can be furnished at Virginia City for a hundred-stamp mill for \$200. At present, the daily cost of transporting Constock ores from the mines to the mills on Carson river is \$1,000, nearly all of which will be saved by having the mills directly at the mines.



NOVA SCOTIA.

Considerable attention is now being directed to Lunenburg county as a promising gold field.

The Empress mine in Renfrew district produced 284 ounces of gold during the month of March.

Miners have been working on tribute at the Mount Uniacke mines and have been earning about \$75 per month per man.

It is stated that a rich streak has been struck in the Rawdon mines, and that one thousand ounces of gold were taken from it during the first two weeks of March.

The first clean up at the Crow's Nest mine, in the Sherbrooke district, Gaysborough county, showed a yield of 75 ounces of fine gold from 37 tons of quartz put through the mill.

At the Antimony Mines at West Gore, Hants County, two inclined shafts and one perpendicular have been sunk. The ore is at present hoisted by horse power, but it is the intention of the owners to put in steam hoisting gear. Forty men are now employed in the mine, and their number will be increased to 60 or 70. 100 tons of ore, valued at from \$50 to \$55 a ton, are shipped monthly to England via Halifax.

Those interested in the development of the gold mines of this province are anxious that the local government should incur the expense of sinking a shaft to the depth of 1000 or 1200 feet for the purpose of proving the continuity or recurrence of the "pay-streaks" in quartz veins. As no practical test has yet been made, and as there is good reason to believe that deep mining would pay, it is not unreasonable to ask for government aid in settling the question. The government receives a royalty on all the gold mined in the province, and would, therefore, be warranted in incurring the expense of so practical a test, in view of the possibilities which might result therefrom.

ONTARIO.

(Thunder Bay District.)

It has been reported that the miners at *Rabbit Mountain* have come upon a very rich vein, but the report has not been verified.

At the *Huronian* mine the shaft is now down 200 feet and at this level the vein is six feet wide, and producing ore that mills \$20 a ton.

A mica deposit, situated about fifty miles west of Port Arthur, will probably be developed this Spring and its actual value ascertained.

At the East end of Silver Mountain a branch vein is being followed alongside the main one. It carries rich ore and is eighteen inches wide.

Steam drills, air compressors and miscellaneous machinery, arrived at the *Beaver* mine in March, and are probably in working order by this time.

Some fine ore is now in sight at *Silver Falls* mine but the work of development is not being driven as actively as the location deserves.

The main vein has been reached at East End Silver Mountain mine. It shows very rich and work is being vigorously pushed ahead.

Work is progressing favourably at *Crown Point* mine and the promising character of the ore warrants continued efforts being made towards further development.

The site on which the mill for the *Beaver* mine is to be erected is on Silver creek, in a position convenient to the *Beaver* and *Silver Creek* mines, and a tramway has already been located thereto.

Mr. Richard Crow has been engaged to operate the mill at the *Beaver* mine. This gentleman was employed last year by the *Huronian* Gold Mining Company, and proved himself a competent mill man.

Preparations have been in progress to open up four mining locations in Black Bay country along the line of the Canadian Pacific railway, between Loon Lake and Black Sturgeon river. These include three argentiferous galena veins.

BRITISH COLUMBIA.

About six miles of McGulloch creek is available for mining and it is thought several hundred miners will make good pay there during the coming season.

A large amount of eastern capital is finding its way into Big Bend country, and it is expected that the placer and quartz claims will be vigorously worked.

The Homestake company, who are working on the Tulameen fifteen miles above Granite creek, took out \$523 in gold for three days work the last week in March.

Until the water lowers in the creeks of the Semilkameen district it will be impossible to resume mining operations, and this is not looked for until the end of May, or later.

Mining on Granite Creek received a check in the beginning of April. Work had been in progress for some weeks when a warm spell caused a freshet, necessitating the suspension of mining for an indefinite time.

Camp creek, Cairn creek, French creek, Gold creek and McCulloch creek, in the Big Bend district, will be worked to some extent this season, and it is expected a lively camp will spring up near the mouth of McCulloch creek.

It was expected that bed-rock would be reached about May 1st on the Barrett claim which is located on McCulloch Creek, higher up than the Ophir Bed-Rock Flume Company's. The tunnel is in 600 feet.

Mr. D. Jordan, of San Francisco, who recently purchased a tract of coal lands contiguous to the Wellington mines, has been superintending the sinking of prospecting bores and the extension of the slope. He is well satisfied with the result of these operations up to the present time.

In accounting for the failures in quartz mining in the Cariboo district heretofore, it is said to be due to improper treatment of the pyritous quartz which is said to carry \$20 to the ton in

finely disseminated gold locked up in the sulphuret and which has been worked as free milling ore. Thus, for the want of concentrating machinery, the pyrites passed off, carrying the gold with it.

At a public meeting in Farwell in February it was decided to petition the Local Government to aid in improving the means of communication between the Big Bend mines and Farwell, including the construction of a waggon road from La Porte to Ground Hog Basin, at the head of McCulloch's Creek, so as to facilitate the transportation of machinery and supplies to the various mining camps.

The Ophir Bed-Rock Flume Company propose constructing a flume the entire length of their ground which extends for a mile and a half along McCulloch Creek, in the Big Bend district. Into this will be hydraulized the gravel for 100 feet in width down to bed-rock, 60 feet below the surface. The flume will be seven feet wide, through which it is intended that 1000 yards of earth will pass each twenty-four hours. The gravel prospects ten cents to the pan.

UNITED STATES.

Colorado is credited with a bullion product for 1885 of \$22,800,000, of which \$13,000,000 was silver, \$5,000,000 gold, \$4,000,000 lead, and \$500,000 copper.

The Ropes gold mine, Michigan, for the month of February, produced from bullion and concentrates, about \$3,000 in precious metal, averaging about \$6.50 per ton of rock treated.

The shipments of last season from the Quincy mine, Mich., to Detroit smelters, aggregated 7,091,765 pounds of mineral which yielded about 82.47 per cent., or 5,848,197 pounds, of refined copper, and gave a mining profit of \$229,895.45.

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**MINING REGULATIONS**

To Govern the Disposal of

Mineral Lands other than Coal Lands.**1886.**

THESE REGULATIONS shall be applicable to all Dominion Lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, iron, or other mineral deposits of economic value, with the exception of coal.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein, either by surface or subterranean prospecting, for mineral deposits, with a view to obtaining under the Regulations a mining location for the same, but no mining location or mining claim shall be granted until the discovery of the vein, lode, or deposit of mineral or metal within the limits of the location or claim.

QUARTZ MINING.

A location for mining, except for iron, on veins, lodes, or ledges of quartz or other rock in place, shall not exceed twenty acres in area. Its length shall not be more than three times its breadth, and its surface boundary shall be four straight lines, the opposite sides of which shall be parallel, except where prior locations would prevent, in which case it may be of such a shape as may be approved of by the Superintendent of Mines.

Any person having discovered a mineral deposit may obtain a mining location therefor, in the manner set forth in the Regulations which provide for the character of the survey and the marks necessary to designate the location on the ground.

When the location has been marked conformably to the requirements of the Regulations, the claimant shall, within sixty days thereafter, file with the local agent in the Dominion Lands Office for the district in which the location is situated, a declaration or oath setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as aforesaid; and shall, along with such declaration, pay to the said agent an entry fee of FIVE DOLLARS. The agent's receipt for such fee will be the claimant's authority to enter into possession of the location applied for.

At any time before the expiration of FIVE years from the date of his obtaining the agent's receipt, it shall be open to the claimant to purchase the location on filing with the local agent proof that he has expended not less than FIVE HUNDRED DOLLARS in actual mining operation on the same; but the claimant is required before the expiration of each of the five years, to prove that he has performed not less than ONE HUNDRED DOLLARS' worth of labour during the year in the actual development of his claim, and at the same time obtain a renewal of his location receipt, for which he is required to pay a fee of FIVE DOLLARS.

The price to be paid for a mining location shall be at the rate of FIVE DOLLARS PER ACRE, cash, and the sum of FIFTY DOLLARS extra for the survey of same.

Not more than one mining location shall be granted to any individual claimant upon the same lode or vein.

IRON—The Minister of the Interior may grant a location for the mining of iron, not exceeding 160 acres in area, which shall be bounded by north and south and east and west lines astronomically, and its breadth shall equal its length. Provided, that should any person making an application purporting to be for the purpose of mining iron thus obtain, whether in good faith or fraudulently, possession of a valuable mineral deposit other than iron, his right in such deposit shall be restricted to the area prescribed by the Regulations for other minerals, and the rest of the location shall revert to the Crown for such disposition as the Minister may direct.

The Regulations also provide for the manner in which land may be acquired for milling purposes, reduction works, or other works incidental to mining operations.

Locations taken up prior to this date may, until the 1st August, 1886, be re-marked and re-entered in conformity with the Regulations without payment of new fees, in cases where no existing interests would thereby be prejudicially affected.

PLACER MINING.

The Regulations laid down in respect of quartz mining shall be applicable to placer mining as far as they relate to entries, entry fees, assignments, marking of localities, agents' receipts, and generally where they can be applied.

The nature and size of placer mining claims are provided for in the Regulations, including bar, dry, bench, creek or hill diggings, and the RIGHTS AND DUTIES OF MINERS are fully set forth.

The Regulations apply also to

BED-ROCK FLUMES, DRAINAGE OF MINES, AND DITCHES.

The GENERAL PROVISIONS of the Regulations include the interpretation of expressions used therein; how disputes shall be heard and adjudicated upon; under what circumstances miners shall be entitled to absent themselves from their locations or diggings, &c., &c.

THE SCHEDULE OF MINING REGULATIONS

Contain the forms to be observed in the drawing up of all documents, such as:—"Application and affidavit of discoverer of quartz mine." "Receipt for fee paid by applicant for mining location." "Receipt for fee on extension of time for purchase of a mining location." "Patent of a mining location." "Certificate of the assignment of a mining location." "Application for grant for placer mining and affidavit of applicant." "Grant for placer mining." "Certificate of the assignment of a placer mining claim." "Grant to a bed-rock flume Company." "Grant for drainage." "Grant of right to divert water and construct ditches."

Since the publication, in 1884, of the Mining Regulation to govern the disposal of Dominion Mineral Lands, the same have been carefully and thoroughly revised with a view to ensure ample protection to the public interests and at the same time to encourage the prospector and miner in order that the mineral resources may be made valuable by development.

COPIES OF THE REGULATIONS MAY BE OBTAINED UPON APPLICATION TO THE DEPARTMENT OF THE INTERIOR.

A. M. BURGESS,

Deputy Minister of the Interior.



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DEPARTMENT OF INLAND REVENUE.

AN ACT RESPECTING AGRICULTURAL FERTILIZERS.

THE public is hereby notified that the provisions of the Act respecting AGRICULTURAL FERTILIZERS came into force on the 1st of JANUARY, 1886, and that all Fertilizers sold thereafter require to be sold subject to the conditions and restrictions therein contained—the main features of which are as follows:—

The expression "fertilizer" means and includes all fertilizers which are sold at more than TEN DOLLARS per ton, and which contain ammonia or its equivalent of nitrogen, or phosphoric acid.

Every manufacturer or importer of fertilizers for sale, shall, in the course of the month of January in each year and before offering the said fertilizer for sale, transmit to the Minister of Inland Revenue, carriage paid, a sealed glass jar, containing at least two pounds of the fertilizer manufactured or imported by him, with the certificate of analysis of the same, together with an affidavit setting forth that such jar contains a fair average sample of the fertilizer manufactured or imported by him; and such sample shall be preserved by the Minister of Inland Revenue for the purpose of comparison with any sample of fertilizer which is obtained in the course of the twelve months then next ensuing from such manufacturer or importer, and which is transmitted to the chief analyst for analysis.

If the fertilizer is put up in packages, every such package intended for sale or distribution within Canada shall have the manufacturer's certificate of analysis placed upon or securely attached to each package by the manufacturer; if the fertilizer is in bags, it shall be distinctly stamped or printed upon each bag; if it is in barrels, it shall be either branded, stamped or printed upon the head of each barrel, or distinctly printed upon good paper and securely pasted upon the head of each barrel, or upon a tag securely attached to the head of each barrel; if it is in bulk, the manufacturer's certificate shall be produced and a copy given to each purchaser.

No fertilizer shall be sold or offered or exposed for sale unless a certificate of analysis and a sample of the same shall have been transmitted to the Minister of Inland Revenue, and the provisions of the foregoing sub-section have been complied with.

Every person who sells, or offers or exposes for sale, any fertilizer, in respect of which the provisions of this Act have not been complied with,—or who permits a certificate of analysis to be attached to any package, bag or barrel of such fertilizer, or to be produced to the inspector, to accompany the bill of inspection of such inspector, stating that the fertilizer contains a larger percentage of the constituents mentioned in sub-section No. 11 of the Act than is contained therein,—or who sells, offers or exposes for sale any fertilizer purporting to have been inspected and which does not contain the percentage of constituents mentioned in the next preceding section,—or who sells or offers or exposes for sale any fertilizer which does not contain the percentage of constituents mentioned in the manufacturer's certificate accompanying the same, shall be liable in each case to a penalty not exceeding fifty dollars for the first offence, and for each subsequent offence to a penalty not exceeding one hundred dollars: Provided always, that deficiency of one per centum of the ammonia or its equivalent of nitrogen, or of the phosphoric acid, claimed to be contained, shall not be considered as evidence of fraudulent intent.

The Act passed in the forty-seventh year of Her Majesty's reign, chaptered thirty-seven and intitled "an Act to prevent fraud in the manufacture and sale of agricultural fertilizers", is by this Act repealed, except in regard to any offence committed against it or any prosecution or other act commenced and not concluded or completed, and any payment of money due in respect of any provision thereof.

A copy of the Act may be obtained upon application to the Department of Inland Revenue.

E. MIALL,

Commissioner.



NOTICE.

SEALED TENDERS addressed to the undersigned and endorsed "Tender for Indian Supplies" will be received at this office up to noon of TUESDAY, 20th APRIL, 1886, for the delivery of Indian Supplies during the fiscal year ending 30th June, 1887, consisting of Flour, Bacon, Beef, Groceries, Ammunition, Twine, Oxen, Cows, Bulls, Agricultural Implements, Tools, etc., duty paid at various points in Manitoba and the North-west Territories.

Forms of Tender, giving full particulars relative to the Supplies required, dates of delivery, &c., may be had by applying to the undersigned, or to the Indian Commissioner at Regina, or to the Indian Office, Winnipeg.

Parties may tender for each description of goods (or for any portion of each description of goods) separately or for all the goods called for in the Schedules.

Each tender must be accompanied by an accepted Cheque in favour of the Superintendent General of Indian Affairs on a Canadian Bank for at least five per cent. of the amount of the tenders for Manitoba and the North-west Territories, which will be forfeited if the party tendering declines to enter into a contract when called upon to do so, or if he fails to complete the work contracted for. If the tender be not accepted the cheque will be returned.

Tenders must make up in the Money columns in the Schedule the total money value of the goods they offer to supply, or their tender will not be entertained.

Each tender must, in addition to the signature of the tenderer, be signed by two sureties acceptable to the Department, for the proper performance of the contract.

In all cases where transportation may be only partial by rail, contractors must make proper arrangements for supplies to be forwarded at once from railway stations to their destination in the Government Warehouse at the point of delivery.

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Deputy of the Superintendent-General
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Dept. of Indian Affairs,
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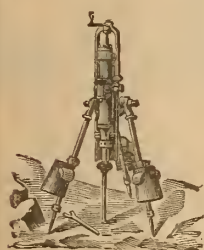
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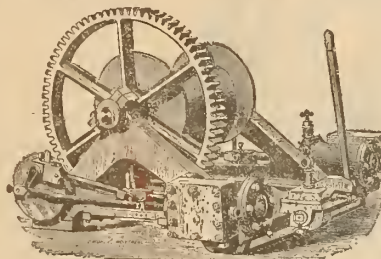
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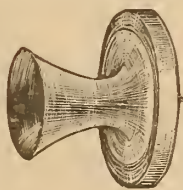
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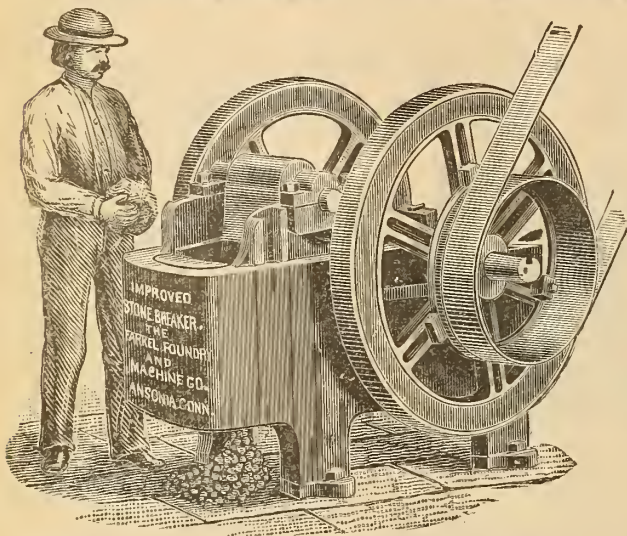
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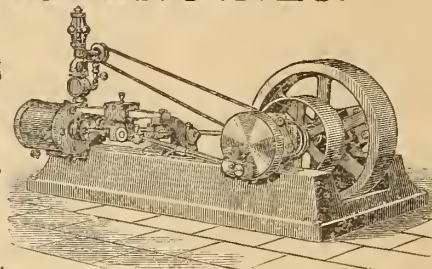
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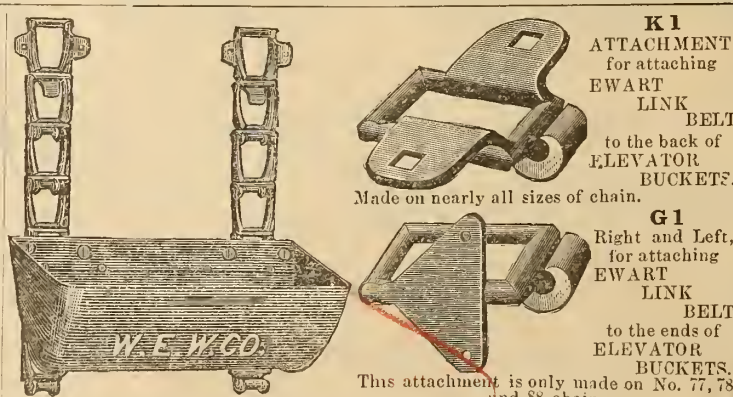
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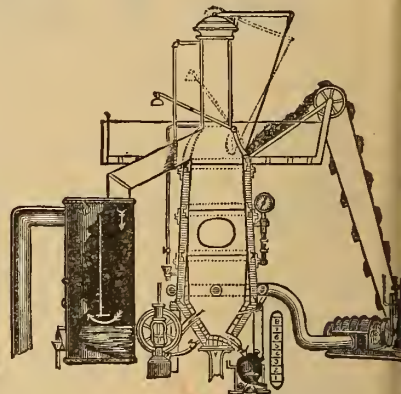
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A. GOBEIL,
Secretary

Department of Public Works,
Ottawa, 12th March, 1886.

Canadian Mining Review.

OTTAWA.

PUBLISHED MONTHLY.

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OFFICE:

UNION CHAMBERS, 14 Metcalfe Street.

The CANADIAN MINING REVIEW is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts as well as others interested in Canadian Mineral Lands are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 20th of the month.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

We understand a start has been made towards preparing a statistical report of Canadian mines, and while we welcome this information we would express the hope that this very important work will be proceeded with without interruption.

It now looks as though the collection and publication of mining statistics will receive some attention from the Geological Survey, but we fear the staff which has been told off for this special work, with the meagre assistance at its command for collecting and compiling statistics, is quite inadequate to do justice to this important work. The ability of Messrs. Coste and Ingall, the two Mining Geologists of the Survey, to whom this special work has been assigned, is not brought into question, but it is unreasonable to expect that these two gentlemen, in addition to performing their professional duties in the field, as heretofore, can organize and conduct the mining and mineralogical branch of the Survey, and collect and compile statistics in connection therewith in a manner that will do themselves justice or satisfy the mining public. If the information that this work is to supply is to be of any value it must be full and complete. That it may be so, it will be necessary to thoroughly organize a special branch of the Survey with an efficient and adequate staff under a competent and distinct head. Proper organization will produce valuable results, and it will be money well spent if a certain sum be set aside annually for the support of a useful mining and mineralogical department. It has been argued by the Director that the present appropriation for the Geological Survey is not more than sufficient to carry

on strictly scientific work and research. If this be so it would not be unreasonable to expect the Minister of the Interior to ask Parliament for a special appropriation to defray the expense of conducting a mining and mineralogical department in the interest of the mining public.

We have refrained from commenting on the Morrison tariff bill for the reason that it must be clear to every one interested in the production of coal and iron ore in Canada that they would be benefited by reciprocity between the United States and this country in these two articles. We would of course be much pleased to hear that Mr. Morrison had succeeded in carrying his bill as originally presented to Congress, but we have felt at the same time that nothing we could say would convince those who have so strenuously opposed the bill that they would derive substantial benefit by removing the duty from foreign iron ore, and that we advocated its removal with a purely unselfish and disinterested motive. We prefer that our cause should be taken up by Mr. Morrison, Mr. Shriver, Secretary of the New York Metal Exchange, backed by Mr. Herbert W. Griffiths, Editor of the London (Eng.) *Iron Trade Exchange*, and other able champions of free trade; but, so far, these gentlemen have not been able to befriend us against such a powerful combination as the representatives of the iron ore industries of the Lake Superior region, supported by Mr. James M. Swank, of the *Bulletin of the American Iron and Steel Association*, Mr. Wilson Day, of the *Iron Trade Review* (Cleveland, O.) and other red-hot protectionists.

If it has been proved conclusively that the manufacture of iron cannot be profitably carried on in the provinces of Ontario and Quebec, and if the vast ore deposits of these two provinces are ever to become remunerative to their owners, something must be done towards developing them. There is a market in the United States for all the ore we can produce suitable for steel making, and at a price that should return a fair margin of profit to the miner. The present duty on iron ore imposed by the United States is not a prohibitory one for the higher grade ores, and by a reasonable expenditure in improving the handling and shipping facilities, the cost of transportation could be so reduced that the reduction from present freight rates would be sufficient to cover the duty. It is childish to sit and gaze at our extensive ore deposits and wait for reciprocity or removal of the duties from iron ore by the United States.

We are not disposed to admit that iron cannot be manufactured to great advantage in central Canada. The ore is, for the most part, such as few countries can boast of, and the deposits are surrounded by dense forests of wood suitable for charcoal, and limestone beds are close at hand. In the western and eastern provinces, British Columbia and Nova Scotia, the iron ore deposits and coal seams lie almost alongside each

other, yet, where in these provinces is iron profitably manufactured? The cause for this should be searched for until discovered and then overcome. Proper encouragement should be given to those who are disposed to work out the problem and are prepared to demonstrate that iron can be profitably manufactured in Canada, and such encouragement must come from the Government in the form of a bounty on pig and bar iron, and steel, for a term of years which will be equivalent to what would be considered a reasonable duty on the same, and when it had been conclusively demonstrated that Canada is capable of supplying her market with these articles of home manufacture, then let the bounty be withdrawn and a protective duty be imposed. In his budget speech this session the Finance Minister read to the House a list of articles, which, being raw material, as he described them, would be admitted free of duty. Pig iron appears on this list, and while we object to it being classed as raw material, we would not advocate a duty being levied on imported pig until such time as we are sure of a fair portion of our requirements being supplied by home manufacturers.

THE PHOSPHATE TRADE.

The annually increasing importance of this industry in Canada is very marked. Canadian phosphate has gained high favour amongst British manufacturers of superphosphate, and if the high standard of last year's shipments is maintained the demand for it will continue to rapidly increase. These assertions are emphatically endorsed by Mr. John Dyke, the Liverpool agent of the Department of Agriculture, who, in his annual report to the Minister of Agriculture, dated Liverpool, 31st December, 1885, says: "I have had a large number of enquiries from British and continental manufacturers in reference to Canadian phosphate, for which there is an annually increasing demand. Phosphate being a new but important interest in Canada, and destined to become one of the leading industries of the Dominion, I have obtained some special information on the subject from one of the leading merchants of England, and indeed of Europe, in this particular mineral. The shipments of phosphate during the past year from Canadian mines have been of an improved quality. The grade in percentage has been well maintained, even above the average, due chiefly to the greater care taken in dressing and cleaning before the ore has been milled. Previous to last year (1884) the percentage of the ore ran about 80 per cent. to 82 per cent., while some parcels received this year (1885) have come up to 85 or 86 per cent. of tribasic phosphate of lime. There is no reason why the regular output of Canadian phosphate, or, at any rate, a larger proportion of it, should not run to 85 per cent. It might be shipped continuously as pure as that, if proper care were taken in dressing and in separating it from foreign matter. The Canadian phosphate has, during the past few years, been in great favor amongst

manufacturers, and if producers can continue, and it is thought they can, to maintain the grade shipped during the past season, there is no reason why it should not take the lead of favour for prime phosphate. Although the volume of business done during the past year has been on the increase, and above the average, prices have receded, and closed 2d. per degree lower than they began the year, the ruling rate at the close of the season being 1s. for 75 per cent., with one-fifth of a penny rise. This price ruled for the last three months of the year, and it may be anticipated that if any change does take place it must be an advance.

With regard to ocean freights, the average for phosphate shipments from Montreal to London over the past season (1885) was 5s. 6d, having varied from 3s. to 7s. per ton. To Hamburg 12s. 6d. was the ruling rate."

Up to within a very recent date no definite action had been taken in Canada for the manufacture of superphosphate. Steps, however, have now been taken which may lead to the establishment of that industry. At the Basin du Lièvre, a point convenient to the mines, a mill has been erected, and is now in running order, for crushing, grinding and pulverizing the raw phosphate rock. A bolting apparatus is affixed to the machinery by which the pulverized material is reduced to an impalpable powder. This mill has a capacity equal to the production of forty tons per day, of ten hours, and to it there are blowers attached by use of which extraneous matter is separated. It is to be hoped that before long agriculturists in Canada will see the necessity of retaining in our own country a portion of the product of the mines, so valuable for renewing lands worn out by perpetual cropping.

THE MINES.

The mine which has attracted the most attention in the district during the past year is owned by the Dominion Phosphate company, and known as the "North Star." The Dominion company were the first to engage in deep mining in the phosphate deposits of Canada, and were actuated in doing so by a desire to prove a theory advanced by eminent scietists, including Prof. Wm. Boyd Hawkins, of Manchester, England, one of the leading geologists of the day, who, in 1884, visited the phosphate mines and did not hesitate to publish his opinion that at none of the mines visited by him had a sufficient depth been reached at which it should be expected that the main body of the deposits would we met with. His theory was that the larger bodies of ore would be found at depths varying from 300 to 1,000 feet below the surface. This theory has been practically proved correct. At the "North Star" mine the main shaft, from which upwards of 5,000 tons have been raised, has reached a depth of 300 feet, at which level it is penetrating a body of ore much larger than anything ever before met with in the district, and having the appearance of the main body of the deposit.

The "Union," "High Rock," "Emerald" and "Little Rapids," as well as the "North Star," mines, are producing high grade ore in large quantity and have already upwards of 14,000 tons awaiting shipment. This, together with the output of the McLaren & Blackburn mine in Templeton, and the

less important mines of the phosphate district makes a total of about 17,000 tons which has been mined since the close of navigation last year and is now ready for shipping. As we have already stated, more attention than formerly is being given to deep mining, and those who have so directed their operations have been much encouraged.

TRANSPORTATION OF ORE.

Among the important improvements which have recently been made for the more economical and expeditious transportation of ore, may be mentioned the completion of a tramway by the Phosphate of Lime company from their "High Rock" mine to the bank of the du Lièvre River. The company will begin to ferward ore over the tramway early in May and will be enabled to deliver their entire output at point of shipment without interruption and at a much reduced cost. Five new ore scows have been launched since the ice left the du Lièvre river, and Messrs. Lomer, Rolir & Co, have put on another steam tug, the "Kate," which is the best boat now on the river. There are now a sufficient number of ore vessels to supply transport accommodation that will insure the delivery of the entire output of the mines at the railway terminus during the summer months.

Transportation of ore has not yet begun on the river on account of the unusual force of the spring fieshet, and ore will not begin to move until the water has sufficiently receded, which is not likely to be the case before about the 10th of May.

GRINDING PHOSPHATE ROCK.

This is the first year that this branch of our phosphate industry has been engaged in. The Portland Phosphate Mining and Milling Company's mill at the Basin du Lièvre is now working and turning out about forty tons a day of ground phosphate. About 4,000 tons of the product of the mill have been contracted for by manufacturers of fertilizers in Chicago, Buffalo and Cleveland; the two former taking low grade and the latter the higher grade phosphate. It is not unlikely that the principal market for Canadian ground phosphate will be in the United States and that for sometime to come the lower grades will be most in demand, until manufacturers have come to appreciate the value of the high grade fertilizers such as can be produced from the better quality of Canadian phosphate rock.

The Portland M.M. & P. Co. have it in contemplation to erect sulphuric acid Works alongside their mill and to establish a factory for the manufacture of superphosphate in connection therewith. This company's operations will be watched with much interest, and it is to be hoped they will make a success of this new enterprise.

Phosphate Quotations.

It would appear from the most recent quotations received from abroad that Canadian phosphate rules in London and Liverpool at one shilling a unit for 80 per cent. mineral with a fifth of a penny rise, and in Hamburg at one shilling and five-eighths of a penny per unit with a fifth of a penny rise. This is not quite so good a price as was being offered at this date last season, but it will, nevertheless, admit of a very handsome margin of profit. One shilling a unit for 80 per cent., with a fifth of a penny rise, is equivalent to \$17.25 per ton for 80 per cent. and \$18.50 per ton for 85 per cent., delivered on board ship in Montreal, with freight between Montreal and Liverpool and London at the same rate which ruled last year.

Villeneuve Mica Mine.

The British and Canadian Mica and Mining Company are now systematically at work in their Villeneuve mine and are taking out a large amount of excellent mica, but owing to a scarcity of cutters a large quantity has accumulated which awaits being cut into plates and otherwise prepared for market. As this is the first mica mine which has been opened in the district the company have found it difficult to procure additional hands, experienced in cutting, cleaning, sorting and packing, to keep abreast of the output since the force of miners has been increased, and have been obliged to send to North Carolina for this description of skilled labour. Several men of long experience in the North Carolina mica mines have been engaged and are on their way to the Villeneuve mine. There is now a rapidly increasing demand for this mica, and the mine is capable of supplying all the consumers. The drifts and cross-cuts are developing some strong micaceous leads, carrying large and perfectly formed crystals, and it may be said that the mine is now being practically worked. The feldspar, one of the by-products of this mine, is of a very superior quality and commands a market value which is nearly sufficient to pay all the mining expenses. It is very white and quite free from iron, and has been pronounced suitable for the manufacture of porcelain. The British and Canadian Mica and Mining Company are to be congratulated on having acquired so valuable a property and on the satisfactory way it has developed since they became its proprietors and took possession.

MINERAL RESOURCES OF NOVA SCOTIA.

There are in this province extensive deposits of coal and iron ore, and her gold fields are increasing in importance with each year's development. Copper, manganese, antimony, barytes, gypsum, marble, etc., also occur in abundance, and the deposits have been worked to some extent. These resources are being gradually developed, and offer a promising field to the miner and capitalist.

The Inspector of Mines for Nova Scotia, in his annual report, recently published, gives a summary of the mineral production of the province for the year 1885, compared with that of the previous year, as follows:—

	1884	1885
Gold.....Ounces	16,079	22,203
Iron Ore.....Tons	54,885	48,129
Manganese Ore....."	302	353½
Copper....."	110	.....
Lead....."	100	.....
Barytes....."	.....	300
Antimony....."	600	*758
Coal raised....."	1,389,295	1,352,205
Gypsum....."	111,068	87,644
Building stone....."	780	3,827
Coke made....."	40,085	30,185
Limestone....."	25,567	16,429
Grindstones, etc....."	2,200	2,208

* Amount exported.

COAL.

Nova Scotia coals belong entirely to the bituminous system of Dana, and may be sub-divided into coking, free burning and cannel coals. It may be remarked that the coals of this country belong to the same geological horizon of the carboniferous system as those of England and the Eastern United States, and present many points of intimate connection in fossil remains and in the associated strata.

The Sydney coal field occupies the eastern shore of Cape Breton County. Its land area is estimated at 200 square miles, and it now forms the rim of an extensive coal field extending under the Atlantic. Experience has proved that nearly all the seams can be followed in their subaqueous extension. Estimates based on the system of enquiry adopted by the Royal Commission on the duration of the coal supply of Great Britain, put the amount of available coal in these submarine areas, after making proper deductions for waste, etc., at not less than 2,000,000,000 tons. The amount of available coal contained in the seams now opened in this district, in the areas leased for the purpose of working them, is estimated at 212,000,000 tons. This estimate does not include the coal in the seams which are unopened in the land areas in operation, nor the value of the seams in the leases which are at present awaiting a favorable opportunity for development, which items would swell the coal supply of this district to figures representing many years' output greatly exceeding any yet obtained.

The following analyses show the general character of the seams of the district:—

COMPOSITION.	NAME OF SEAM.		
	Sidney.	Phalen.	Harbor.
Moisture	1.260	.921	.80
Vol. Comb. Matt. Fast Coking	35.514	30.312	29.40
Fixed Carbon	59.111	62.334	65.50
Vol. Comb. Matt. Slow Coking	33.840	28.625	27.85
Fixed Carbon	60.785	64.021	67.05
Ash	4.115	6.433	4.30
Sulphur	1.705	1.105	1.29
Theo. Evaporative power	8.33	8.78	9.19

The Springhill coal field lies north of the Cobequid mountains, in Cumberland County, the northern edge of which has been traced from the Joggins shore of Cumberland basin, about 18 miles, to the Styles mine, but its deflection to the south to join the Springhill coal mines district has not been followed. On the southern or Springhill side of the basin there is a large and important development of coal seams. The productive measures stretch for many miles in a westerly direction to the Cumberland basin at Apple river, but have not yet been prospected. The chief development has been at Springhill by the Cumberland Railway and Coal Company, whose output is now at the rate of 350,000 tons per annum. and is largely used for steam purposes on Canadian railways, steamboats, etc. The coal is also adapted for domestic purposes, and its coke is extensively used at the Londonderry iron works.

The following analyses show the quality of the coal of this district:—

CONTENTS.	North Seam.		
	North Seam.	Main Seam.	South Seam.
Moisture	1.625	.78	1.39
Vol. Comb. Matt.	28.672	31.32	31.32
Fixed Carbon	65.431	62.54	61.58
Ash	4.272	5.34	5.79
Sulphur	.783	1.38	.80
Evaporative power	8.99	.....	8.46

The extent of country underlain by the productive measures is not yet clearly known, but has been estimated at 300 square miles. The district is intersected by the Intercolonial Railway, and a branch railway runs from the Springhill collieries to Parrsboro, on the Bay of Fundy, where extensive shipping docks are being constructed.

The principal collieries now in operation, and the respective output of each for 1885, are as follows:

Name of Colliery.	Situation.	Output for 1885.
		Tons.
Chignecto	Cumberland County.	6,084
Joggins	"	17,664
Minudie	"	7,702
Springhill	"	335,055
Acadia	Pictou County.	98,150
Albion	"	129,195
Intercolonial	"	109,139
Vale	"	76,125
Sydney	Cape Breton County.	124,274
Victoria	"	47,614
Lingan	"	21,761
Reserve	"	83,276
International	"	67,959
Bridgeport	"	13,178
Little Glace Bay	"	39,400
Caledonia	"	58,859
Block House	"	11,075
Gowrie	"	74,414
		1,320,924
Unimportant collieries		31,281
Total		1,352,205

The sales of Nova Scotia coal for 1885 were as follows:—

	Tons.
Provinces of Nova Scotia	444,652
New Brunswick	148,634
Newfoundland	74,322
Prince Edward Island	52,770
Quebec	493,917
West Indies	5,732
United States	34,483
Total (long tons)	1,254,510

(To be Continued.)

Improved Hoisting Engines.

We have received the most recently published catalogue of the Lidgerwood Manufacturing Company, whose extensive works are in Brooklyn, N.Y., and offices and salesrooms in New York city and Boston. This company are manufacturers of the most modern high-speed hoisting engines, and boilers, for marine service, contractors, miners and railway corporations. A great variety of their engines are illustrated by beautifully finished engravings, and are fully described in the catalogue. All the work of this company is done on the *duplicate part system*, enabling them to fill orders promptly for duplicate parts, which are made to gauge and will fit without trouble. Their system for testing is very complete, and all engines are run with steam on before being shipped, and boilers are thoroughly tested by steam, as well as by the usual hydrostatic test. As will be seen by their advertisement in another column, this company give special attention to engines for mining purposes, and will furnish estimates, &c., on application.

Gold Mining in British Columbia.

The official annual report of the Minister of Mines for 1885 shows a falling off in the year's production of \$22,427 from that of 1884, and the statistics show a large increase in the number of miners engaged in gold mining in some of the gold districts of the province. The total amount of gold known to have been exported by banks, etc., amounted to \$594,782 for the year, and the amount estimated to have been carried away in private hands \$118,956,

making a total yield of \$713,738, as against \$736,165 for 1884. The number of miners employed during the year was 2,902 and the average yearly earnings per man was \$246, as against 1,858 miners employed in 1884 with an average yearly earning of \$396 per man. The decrease in the average yearly earnings is accounted for by the rush to Granite Creek towards the close of the mining season, and by an increased number of Chinamen working during the autumn months on the bars of the Fraser (already worked and re-worked) with but little return for their labour. The statistics show that the increase in the number of miners occurred chiefly in the Yale district, where towards the close of the season there were 998 at work, and the year's yield of gold was only \$146,500. This had the effect of reducing the general average earning for the year, but as nearly nine-tenths of the miners did not reach the diggings in the district until shortly before the season closed, it is reasonable to suppose that next year the total yield from the Yale district will be largely in excess of these figures, and that the general average earning for the province will be increased in like proportion.

The Gold Commissioner of Cariboo states that in his district another year passed without any material development of the quartz ledges, and with the exception of the efforts put forth by the Quesnelle Quartz Mining Company, nothing had been attempted in this direction. The Quesnelle company were, he states, making a most laudable attempt to prove the value of their mine at Hixon Creek and had purchased an engine and other machinery at San Francisco and engaged the services of experienced Californian quartz miners. The Commissioner estimates the gold yield of the district for 1885 to have been \$347,700, and adds that Cariboo has not as yet derived any benefit from railway construction. Freight rates are still high, and Cariboo prices have undergone but little change during the year.

GRANITE CREEK.

This stream, to which there has been a great rush, is a tributary of the Tulaneen, or north fork of the Similkameen, and falls into that river on its right bank, about twelve miles above its junction with the South Similkameen at Princeton—better known as the "Vermillion Forks," and "Allison's." About five miles from its mouth Granite Creek is joined by a small creek from the south-west, which point is called the "Forks." With the exception of a few hundred yards at its mouth, Granite Creek runs from the forks downwards in a deep V shaped gorge, through which the yearly freshet, evidently of great volume, has washed everything except the gold and some gravel—in fact this portion of the creek has been ground sluiced by nature. Mr. T. Elwyn, Deputy Provincial Secretary, visited Granite Creek last autumn, and reports that from near its mouth to a point something over half a mile below the "Forks," a distance of about four miles, no claim which has been tested on either side of the bed of the stream has failed to yield good returns, the ground for that distance averaging over an ounce a day to the hand. On 31st October, on lower Granite Creek, there were 62 companies owning creek claims, averaging probably 300 feet to the company, who were working. Of these, 34 were taking out gold and 28 either preparing to do so or prospecting. The gold admitted to have been taken out by the several white and Chinese companies, from 5th July to 31st October, 1885, amounted to \$90,000, which, considering the great loss of time caused by the freshet, and the difficulty of obtaining lumber

for sluice-boxes, is a creditable showing. On the morning of November 1st one company washed up \$750, the result of the labour of eight men for thirty hours. Mr. Elwyn believes that the discoveries on Granite Creek will lead to the opening up of an extensive gold field which will be of more benefit to the province than any yet discovered, except, perhaps, Cariboo. He states that he was particularly impressed with the fact that those who were warmest in praise of these new diggings were amongst the most experienced miners who had gone into the district.

CANADA'S IRON TRADE.

We are indebted to the publishers, Messrs. Dawson Bros., of Montreal, for a copy of a very interesting work entitled "The Manufacture, Consumption and Production of Iron, Steel and Coal in the Dominion of Canada, with some notes on the manufacture of iron, and on the iron trade, in other countries." Mr. James Herbert Bartlett, Associate Member of the Institute of Civil Engineers, &c., &c., the author of this work, is deserving of much praise for the careful manner in which he has compiled the information it contains. The author's aim has been to bring into prominent notice the importance to the Dominion of Canada of the manufacture of iron within her borders, and to show how this industry would benefit the country and develop her resources. The subject suggests many important questions which are ably dealt with by the author, whose researches in the direction of statistical detail have been of an exhaustive character, and it is evident no pains have been spared in tabulating the same in an intelligent and comprehensive manner. Mr. Bartlett appears to appreciate the fact that reliable, practical information in connection with the manufacture of iron in Canada has been much needed, and, in treating the subject from a commercial rather than from a scientific point of view, he points out the conditions under which other nations have succeeded and gives the value of the manufactured articles imported into Canada and the quantities consumed.

Statistics of the imports and exports of iron and the manufactures thereof have been compiled from the Dominion Trade and Navigation Returns, and show that the value of the imports, including duty paid thereon, for the seventeen years since Confederation—1869-1884, inclusive—has reached the enormous sum of \$252,638,613.44, or an average of about \$14,860,000 a year. The classification and tabulation of statistics in connection with the various branches of the iron and steel industries represent a remarkable amount of patience and perseverance on the part of the author and have been so arranged by him as to be easily available for reference. As a statistical work the book will prove very valuable, and besides being replete with interesting and useful information it will undoubtedly draw attention to the very important subjects on which it treats. The book reflects great credit on the author and we feel ourselves much indebted to Mr. Bartlett for having put into our hands so much information in so concise a form.

In the Smithsonian Institution at Washington is the small nugget of gold, a little larger than a pea, that first met the eyes of James Marshall in the sawmill raceway at Sacramento, and was the beginning of those discoveries in California that have added nearly \$1,500,000,000 in gold to the world's stock of the precious metals.

CANADA —AT THE— COLONIAL & INDIAN EXHIBITION.

Her Natural History, Mineral & Fisheries Exhibit.

In the west transept of the exhibition building at South Kensington, will be found the collection of natural history specimens, which must prove to visitors one of the leading features of the Canadian display. The Canadian Geological and Natural History Survey has, in itself, enough to form a separate display, though supplementary to it are the Hudson's Bay, the Renfrew and Hubbard collections, thus representing adequately the whole game of the Dominion. The centre of this west transept is, correspondingly with the east transept, occupied by a commanding trophy of game and game birds, and even those of the migratory class, arranged with no little tact and judgment. From this point the west gallery is reached. *Here the mineral resources of Canada are set out in full array. So rapid has been the growth of the mining industries of the Dominion during the past decade, that the 549 specimens exhibited at Philadelphia have increased to 725 at South Kensington, contributions coming in large numbers and great variety from the mines of Nova Scotia, New Brunswick, Quebec, Ontario, the North-West and British Columbia, and including many specimens of considerable value shown in the process of various dressings from the simple ore. The practical results likely to follow from this mineral exhibit are considerable. One may, perhaps, be not too sanguine in anticipating that so powerful a witness to Canada's vast and rich mineral deposits will even do much to overcome the prejudice of English capitalists against embarking in enterprise in this direction—a prejudice not altogether unnatural, when one remembers the hands into which some Canadian mining ventures have fallen in recent years. Intimate knowledge, such as the present exhibit will encourage, must, however, bring about a different state of things.* In the west gallery the shafting provided will be used for the display of machinery in motion—always an interesting feature to visitors. Here the skilfully-designed agricultural and general products of the Birmingham of Eastern Canada will undoubtedly be the object of much curiosity to English mechanics, agriculturalists and manufacturers. Beyond the west gallery is the west arcade, in which Canada has been provided with some 2,000 feet for the display of the products of her fisheries. The exhibit made in London three years ago is here brought into requisition, with, of course, large additions of stuffed and preserved specimens of fishes and marine invertebrata, as well as schooners, models of salmon hatcheries, fishing tackle and all utensils for sea and lake fishing. The National Fish Culture Association is taking charge of the oval until a fitting receptacle is ready for it. An interesting feature of this part of the Canadian display will be the intended shipment of fish periodically, from Canadian waters, under the refrigerator process, not for sale, but to demonstrate the practicability of direct shipments of the fish of Ontario, Manitoba and British Columbia by direct Canadian rail to the Atlantic port, and thence to England.—*Canadian Gazette, London, Eng.*

The Drum Lumon mine of Montana distinguished itself during January by the largest production on record. Sixty stamps working thirty days crushed 3,456 tons, yielding \$100,831.19.

Notes on the Progress of Mining and Metallurgy in Europe.

By E. J. BALL, PH. D.

Assistant in Metallurgy at the Normal School of Science and Royal School of Mines, London.)

Written specially for the Canadian Mining Review.

The action of coal-dust in colliery explosions continues to excite considerable discussion, notwithstanding the attention it has already received, and R. Schneider, in remarking on the results of some experiments made at the Segen-Gottes Colliery, Moravia, which showed in direct opposition to those obtained in Dr. Hilt's experiments with dust from the same colliery in the Neunkirchen level—that free-lying dynamite would always explode—the Segen-Gottes dust—states that Dr. Hilt suggested that this was probably due to the detonators that were used being too weak, and to their consequently not exploding the dynamite properly, and that it would be therefore well to repeat the experiments with the triple force detonators manufactured by A. Barnhardt, of Brunswick. This was done, but the results were the same as before, the dust being exploded every time without any gas being present. Schneider is consequently of opinion that the difference in the results of the experiments made at the colliery and at Neunkirchen were due to the excessively fiery nature of the dust, which, he considers, must either have been damp or not sufficiently powdered when used in the trials at Neunkirchen. The general conclusions derived from his experiments have, however, tended to confirm those obtained by Dr. Hilt, and attention is drawn to the fact that in all cases where dry and dusty fiery pits are worked the present method of shot firing cannot possibly be practised without danger.

In referring to the investigation recently made at the Gabriel Colliery in the Karwin district, Austria, on the influence of the changes in barometric pressure on the escape of fire-damp, the results of which confirmed those obtained in previous experiments, showing that the danger increased with a falling barometer, J. Mayer remarks that although this may be true in some respects, the chief danger lies in accumulations of coal-dust.

J. Haller has described the method of treatment adopted in working the brown-coal deposit at Liescha, Austria, which is 25 feet thick, and he states that the one originally employed—stopping—caused the ventilation to be so bad, and the temperature so high, that it was abandoned, and a modified post and stall work introduced in its stead. The result was that not only was the ventilation greatly improved, but the work done per man and per shift increased by 39 per cent. The drawing engines in the pit were, until two years ago, worked by steam brought down to them in pipes; this has now been replaced by compressed air with very satisfactory results. The wooden timberings, which had to withstand considerable pressure, and, in consequence, to be frequently renewed at certain places, has been replaced by steel rails, and although their first cost is greatly in excess of that of the wood, they have proved in the long run much more economical.

With regard to the sinking of shafts, J. H. Poetsch has taken out additional patents in Germany, and elsewhere, in which he proposes to employ the pipes he has used in freezing the quicksand through which it was desired to sink the shaft, after it has been sunk and the ground thawed again, either in connection with pumps to partially remove the water or as supports by

filling them with cement, or by otherwise strengthening them.

H. Thomas, of the French Geological Survey, discusses in the *Génie Civil*, the size of the pillars which should be left to support the roof in underground workings, and he gives some figures relating to building stone, calculated from the resistance offered by the materials to crushing stress.

The mineral wealth of Spain is exceedingly great, and its natural advantages are such, that should the country ever succeed in obtaining a settled form of government, its mineral resources are sure to receive considerable attention, and this tends to endow the description by R. A. de Yarza of the mineral deposits of the Province of Guipúzcoa (*Revista Minera of Metalúrgica*, 1886, Jan. 17 and Jan. 24) with considerable interest. The ores found are chiefly those of lead, zinc and iron, as although copper ore has been found it has only been in small quantities, and up to the present is of no importance. No coal beds have been discovered, but some lignite deposits exist in the cretaceous rocks. The galena occurs principally in lodes in palæozoic measures, those occurring in the cretaceous being of far less importance. Zinc blende is also found both in the palæozoic and cretaceous rocks, and calamine also occurs in considerable quantities. Iron ore deposits are abundant, and would be of great importance were they not so close to those of Biscaya, with which it will be difficult for them to compete successfully. The ores, which are of good quality, occur partly as contact deposits between granite and palæozoic rocks, partly in the palæozoic rocks themselves, and occasionally also in the cretaceous.

H. Tweddle describes in *Engineering* the petroleum regions of Europe and Asia, and he states that they extend from the north-western extremity of Great Britain diagonally across Europe, the Crimea, and the Caucasus, and that they terminate in Central Asia. This zone embraces nearly all England and Scotland south of the Grampians, Hanover, Bohemia, Galicia, Moldavia, Roumania, Transylvania and Hungary, the Crimea, the Caucasus chain, and in the trans-Caspian regions, the Island of Tchelen, Krasnovodsk, the Neft Gora, the Heri Rud, and Tashkent, the last explored petroleum region in Central Asia. He remarks on the great similarity of the geological measures where petroleum is known principally to exist, viz., in the cretaceous, though it is found in every formation from the granite and volcanic rocks to the highest and most recent deposits of the Aral-Caspian, and he considers that the zone may fairly be regarded as more or less similar to the petroleum fields of North America. These, it may be mentioned, have been recently described at considerable length by C. Zincken, of Leipzig, Germany.

Turning from mining to the kindred subject metallurgy, the iron and steel industry first claims attention. The chief object of discussion at present is as to the relative advantages of large and small Bessemer converters, and it would seem to be the general opinion, that however advantageous small converters may be under certain conditions, yet, that under ordinary circumstances, it will be impossible for them to compete successfully with large ones.

The basic process is making rapid progress on the continent of Europe, but the progress is somewhat slower in Great Britain, where the abundance of pure ore renders it unnecessary to work deposits of ore which are of lesser purity. Magnesite is coming into considerable use in the manufacture of basic bricks.

Arrangements for the collection of the waste products from coke ovens are gradually being

made use of in the case of those already constructed, and a considerable number of the more modern forms of ovens have been lately erected, the tendency being to employ almost solely horizontal ovens of the modified Coppée type. Compressing the coal by means of rollers after charging, has, it is stated, enabled, in the case of certain German coal, a much better coke to be produced than would otherwise have resulted. It appears to be generally considered that the collection of the ammonia from the waste gases of blast furnaces using coke as fuel is not likely to prove very profitable.

The Manhès process for the Bessemerizing of copper regulus is assuming considerable importance, and the latest form of converter proposed by Manhès, and exhibited by him at the Antwerp Exhibition, resembles in shape the boiler of a horizontal engine. It is cylindrical, and rests on a truck. The tuyère box runs along the side, and holes in its back facing each tuyère permit of rods being inserted through them to keep the nozzles free. The converter is revolved by means of a tooth-wheel and gearing, and the throat is in the centre of the upper portion.

Electrolytic processes are also making considerable advance, though their progress has not been so rapid as was at one time anticipated, the chief reason being that the comparative abundance of fuel and of skilled labor renders it impossible for processes which rely chiefly on the saving effected in these respects at the expense of time to compete with others which enable the capital invested to be turned over far more rapidly. In the case of copper, too, although electrolysis enables the gold and silver present in the material treated to be collected, and a metal to be produced which commands a higher price in the market, still the great majority of the ores contain such small percentages of the precious metals that they, and the higher value of the copper produced, would not compensate for the loss of interest on the capital invested. In countries, however, where fuel is either scarce or costly, and labor expensive and unskilled, electrolytic processes certainly deserve a far greater consideration than they usually receive, more especially in such places where water-power can be made use of, or where the materials to be treated contain an appreciable amount of the precious metals. Electrolytic plants for the treatment of cupriferous materials are, however, being built in various parts of Europe. There are several in the United Kingdom, and they chiefly use metallic anodes, concentrating the silver and gold in "bottoms," which are afterwards cast into the desired shape; anodes of regulus have also been tried, but, I believe, without marked success, although works have recently been erected at Stolberg, in Austria, and in the neighborhood of Genoa, where regulus alone is intended to be used.

Scarcely any attention has been paid in Europe to the employment of electrolysis in the case of lead, but attention is beginning to be directed to its use in the case of zinc ores, though I am unacquainted with any works employing as yet such a process on a commercial scale.

Very many different types of dynamos are in use at works, and in choosing one it seems customary to select that which converts the greatest percentage of energy into electricity; but, however correct this may be from the point of view of an electrician, from that of a metallurgist this perfection of the machine should be by no means the sole consideration, as simplicity of construction and the ease with which repairs can be carried out should receive careful consideration, more especially in such cases where the position of the works will render it impossible

to obtain skilled assistance in case of a breakdown, and where the machine will have to be entrusted to persons who, it may be, have had no experience in its management, and who are wanting theoretical knowledge. Of course no machine should be chosen unless it gave fair results, but I lay stress on the advisability of it being as simple as possible in construction, as this is very frequently overlooked, and my attention was drawn to the subject in the Works where I studied the process.

Two or three adoptions of electricity to the treatment of gold ores have been more or less discussed of late, but opinion is still very much divided as to their merits.

Numerous so-called improved forms of amalgamators, &c., have been proposed, but most appear worthless, and the great majority of the others have scarcely advanced beyond the patent stage.

CORRESPONDENCE.

MINING RECORDS.

Editor Canadian Mining Review.

Experience in the old world may be of use in the new. In Ireland, the earliest written record I can find is one A. M. 3656, and since then they are few and far between. There are, however, other records, in the old attics and other waste heaps; but who were the miners? and when were they worked? or what they did underground it is impossible to say. The latter is even the case with works carried on within the present century, not a record having been kept except in a few cases, and if an adventurer starts a mine in or near an old sett, he has to take chances, while after he has come on a good lode and made all preparations for working a mine, he may find that the "old men" have been before him and cut out all "the riches." This has been the case over and over again in our modern mining operations; "old men's workings" have spoiled many a good mine. Yet what can be done? Out of the thousands of mines that, from time to time, have been in operation in Ireland, I believe there are not the records of fifty, if of half that number.

I read with great interest the evidence given before the Enquiry held some times since in Ottawa, and had a fellow feeling with the geologists examined, as no matter how zealous, anxious or painstaking a geologist may be, unless he has the power to say—stand and deliver! he cannot get records from unwilling hands.

At the present time, according to the new act, mining agents must annually return records of their working—but not of old workings which are those of most importance in connection with further research. During the last 30 years or more, I have been endeavouring to get copies of these old plans and sections, and in no important mine have I perfectly succeeded. In some few small workings I was able to do so, but invariably in the large ones I was unsuccessful. In most cases the mines had gone through different hands, and at each successive sale of the property, the sellers had either kept back or destroyed all records, except those that they considered advantageous to themselves; consequently to get full plans and sections would necessitate expensive surveys that the company or I could not undertake—or the agent or company might be unwilling to allow the extent of the works to be made public—they might let you look at the plans and sections and say you might copy them, but invariably I found it hard to accomplish the latter,

and never without an amount of tact. When an agent pretends to be willing and at the same time intends to prevent you getting copies of his plans, it takes a great deal of stratagem to circumvent him.

These are my experiences. Some agents cannot give statistics unless he went to great expense in new surveys, while others will not, as they are afraid it might possibly be hereafter detrimental to their interest. To get statistics, therefore, it is necessary to make it compulsory that plans and sections of all mining operations should be furnished to an authorized official, as otherwise no one, no matter how energetic or painstaking, can procure them. The great losses due to unrecorded mines in the "old countries," British and foreign, ought to be a lesson to the new, and teach them to "take time by the forelock." Let them have properly appointed officers whose duty it is to record all mining operations, and to whom all statistics of such operations must be given. In a new country this could be easily managed by insisting on all mining adventures being registered. The register fee might or rather ought to be merely nominal, but coupled with it should be an obligation to furnish, at specified times, full accounts of all mining operations, the neglect of complying with the latter subjecting them to severe penalties. Such a law would not prevent individual research, while it would protect subsequent adventures and the losses so often due to bogus companies.

J. HENRY KINAHAN.

NOVA SCOTIA GOLD FIELDS.

PAY-STREAKS.

Editor Canadian Mining Review.

Not having had the advantages of a personal knowledge of the "Pay-Streaks," I was led, from the descriptions that I had seen, to suppose they were the filling in of vertical shrinkage fissures. Mr. Gilpin's very instructive description of them in March number of the REVIEW, however, seems to suggest that they are the shrinkage fissures on the arch of an anticlinal curve, dipping or "hading" more or less at a high angle at the line of axis of that curve; and these in each district in accordance with the strike of the line of axis, occur in local systems having similar strikes and underlie, the strikes being parallel to the line of axis. If this is the case the fissure ought invariably to decrease in width gradually in depth; the decrease in width being more gradual the more perpendicular the streak—that is, the less the angle between the dip of the streak and the vertical of the axis of the curve, the less the variations in the width of the fissure—that is, the fissures at or near the crown of the arch of the curve, ought to be more uniform in width as followed down than if away from the line of the crown of the arch; the farther from the crown the greater the opening at the surface. This can be seen in sharply folded strata, the quartz veins filling such shrinkage fissures when nearly perpendicular thinning very gradually, while, if underlying at lower angles, the change in their width is much more rapid. If "Pay-Streaks," are the filling in of fissures of this class they must die out in depth and finally end. There is, however, the converse to this: What are the shrinkage fissures in the sides of a synclinal curve? Ought they to open in depth? Is the tension in the strata forming the anticlinal curve similar to the tension in the strata forming the synclinal curve? Of the latter, however,

I cannot speak, as my experience has never furnished an example.

J. HENRY KINAHAN.

Office of

The Geological Survey of Ireland,
Dublin, Ireland.

NORTH SHORE MINES.

LAKE SUPERIOR DISTRICT.

Editor Canadian Mining Review,

SIR,—Seeing in your valuable paper for frequent accounts of the tests at the silver mines in this district, also at the Huronian Mine in the gold region, during the past year, I think a word would not be out of place respecting some of the silver mines upon this shore which were worked more or less twelve years ago.

I speak as a miner who worked in most of the mines mentioned below, and can vouch for the facts in each case.

I will first take the "Silver Harbour" mine. The main shaft at this mine was sunk 120 feet, and another some 30 feet. There was a large amount of black sulphide of silver and silver ore taken out, sufficient, if the mine had been properly handled, to pay working expenses; and when the work was stopped the mine looked well, so much so that an American gentleman would have worked it right along if he could have procured the property on reasonable terms and without restrictions. The company who worked this mine literally squandered their money by erecting a splendid building, which cost some fabulous sum, and was wholly unnecessary; they also spent a large amount for engines and machinery for stamp-mill, which were never used and subsequently went to ruin, instead of opening up and testing their mine at the outset—which has never been done. It is my belief that had the company been mining men, or their manager a practical mining man, this mine would be working and paying large dividends at the present day.

I will next take the "3 A" mine, which is upon the adjoining location to "Silver Harbour," but a distinct vein. The main shaft is down 140 feet, and another about 40 feet. There was a large amount of native silver and nickel silver taken out at this mine; certainly some of the largest specimens of native silver ever taken out on the North Shore were from "3 A," and there was a very fair show of silver when work was suspended. "3 A" may be classed with "Silver Harbour" as regards mismanagement, for there was sufficient silver taken out to pay all expenses and leave a handsome balance had it been properly taken care of.

Should the owners of either "Silver Harbour" or "3 A" mines place their properties upon the market as assessable stock, I am assured the people in this district would readily take them up.

At "Thunder Bay" mine there was only one shaft sunk, about 100 feet in depth, from which a large amount of native silver was taken out, sufficient to pay working expenses if the mine had been worked economically; but here again the company incurred the expense of valuable machinery and stamp-mill, which were afterwards left to ruin, before proving their mine in any way. It is my opinion that should a strong company take hold of this mine and have it thoroughly tested it would turn out well.

"Jarvis Island" was worked and tested to a depth of 130 feet, and found to carry some native silver and silver ore, and when abandoned there was a good show of silver. The

owner of this property intends, I believe, to start work again this spring.

"Spar Island" has not been worked for some 40 years, though it is said to be one of the best mines on this shore. The main vein carries grey copper ore and native silver, a large amount of each, and is 12 feet wide; there is also another vein four feet wide. Some few years ago a gentleman in Port Arthur, who has the control of this estate, had some very fine specimens taken out. The vein shows equally good upon the mainland.

The only mine which has in any sense been tested in this district is "The Duncan." The main shaft was sunk 900 feet, and another shaft 150 feet; the longest drift is 400 feet. The company was a good one, the best upon this shore to the present day, and for 700 feet along vein from main shaft the mine was very fairly tested. They obtained a large quantity of native silver for about 400 feet upon surface, and considerable at a depth of 100 feet, and the core from diamond drill usually assayed silver wherever tested upon vein. The testing upon this 700 feet of the main vein was considerable, but the company did no work or exploring except upon this one vein, although there are several others upon the location all carrying good mineral. It has been reported that a large deposit of silver has recently been discovered upon the location by one of the men who previously worked at this mine.

All the above mines are easy of access, either water, road or rail facilities being excellent, and there are numerous other locations around this district which could be profitably worked under efficient and economical management.

There is no doubt that the owners of the properties in the new silver district and gold region have taken warning from the previous experiences of mining upon this shore and have gone to no unnecessary expense until assured of an adequate supply of mineral to pay for expensive buildings and machinery; but as I see in your paper that capital is seeking investment in mines and mineral lands, I am sure it would amply repay the capitalist to visit and take note of the mines above mentioned, in addition to the new mines which are being opened up all around us.

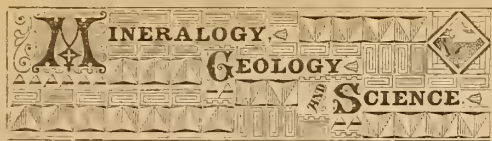
Yours truly,

"A MINER."

Port Arthur,
Lake Superior.

FOSSIL HUMAN FOOTPRINTS.—Herr H. E. Low has obtained and forwarded to the Imperial Museum in Vienna twelve large stone slabs bearing the foot-prints discovered last year in the solid rock in the quarry over Lake Managua, in the territory of Nicaragua. The interest was increased by the statement that those foot-prints had been overlain by eleven different layers of stone, extending to a depth of four meters, and indicating an antiquity for our race quite transcending all conjectures hitherto hazarded. They are about three quarters of a meter square. They can now be inspected by European geologists. The foot-prints are sunk into the stone to a depth of from eight to ten centimeters. The stone itself is a porous tufa, and the superincumbent layers, which had been removed for building purposes, were all of a more or less solid volcanic conglomerate. The foot-prints are very conspicuous, and seem to be those of three distinct persons, one of whom was a child.

The proprietor of Montvale Springs in Blount County, Tenn., has sunk a shaft ninety feet deep on his property and claims to have found a rich vein of silver ore.



All correspondence under this head, and scientific exchanges, must be addressed to the Science Editor, Canadian Mining Review.

Mineralogy of Pliny.

To a student who is following a course of science and literature, many questions of strange interest present themselves. In his scientific studies, on the one hand he becomes aware of the latest discoveries of the day; he is perfectly acquainted with the physical structure of the globe, and seems as conversant with what is written in the records of nature, as the book-worm is with the productions of his favorite author. On the other hand, his literary pursuits transport him into the far past, into the ages of antiquity, and bring before him the simplicity of men of by-gone days, with their odd superstitions and quaint beliefs. He cannot fail to remark the striking contrast between the opinions of the most intelligent and learned of the ancients, and those of the mere student of science of our day.

To exemplify this general idea, we may consider a particular case. See what difference there exists between the knowledge which we have to-day of mineralogy and that which the ancients possessed. A mineralogist who has been so happy as to fall in with Pliny's treatise of mineralogy cannot fail to be amused. During the days when Pliny flourished, a scientist was far different from what he is at present. Whatever was known at Pliny's time, Pliny knew; and whatever Pliny knew is to be found in his admirable works. By reading this author, therefore, we can have an adequate knowledge of what the ancients knew, and in Pliny we can study the light in which mineralogy was once regarded.

Five lengthy books of his "Natural History" are devoted to minerals. But, gentle reader, were you to peruse a work on moral philosophy or a volume of rhetoric, you would then know nearly as much mineralogy as you would after the perusal of Pliny's dissertations.

What, indeed, are these five books if not mere rhetorical dissertations, replete with moral reflections? Admirably written, indeed, his works cannot fail to interest. He has paid great attention to his style and choice of words. He discourses on the ill effects of gold and silver and of the precious stones, and does not hesitate to denounce them as the bane of Roman society. He is loud in his lamentations because of the introduction of these "articles of luxury," the cause of effeminacy, the corrupter of morals. This is his unceasing strain while he is speaking of gold, and occasionally he is strong in his invectives against the unknown inventor of such and such a perfidy.

In the first of his five books he treats of metals, beginning with gold. After a severe criticism of Roman luxury, we are presented with a complete history of rings, then of crowns, and lastly of gold coin, the invention of which "was an enormous crime against humanity." A slight allusion to the ductibility of gold and the manner of procuring this metal is what comes nearest to the subject of mineralogy. Read what he says about silver, and you have a good idea of ancient mirrors, vases, plates and statues of silver. Read his second book, on copper, and you have a perfect knowledge of bronze statues and chandeliers. We must not

omit medicine; this is a strong point in Pliny's works. He delights in dwelling on the medicinal properties of the metals, most of which were used for that purpose in his time. In fact, iron and lead are scarcely treated under any other head.

The third book is an excellent treatise on painting; the fourth is devoted to marble sculpture, while the fifth treats of precious stones. This is by far the most useful part of Pliny's work. He displays in it a wonderfully extensive knowledge of the gems which had become at that time very extensively used in Roman society. It is needless to state that, in a strictly mineralogical sense, his vast erudition fails to give even a clue to the science of gems. His classification is entirely artificial. Gems which, for instance, are varieties of quartz are given as totally different species; whilst others, widely different in composition and crystallographic characters, are brought together with regard solely to their external properties. But we are inclined to be indulgent towards the old Roman *savant* when we consider the amount of invaluable information he imparts and the graceful diction he employs, and we willingly admit that science would soon become popular if all scientists could and would imitate Pliny's attractive style.

W. A. H.

Aluminum.

"The metal of the future" is the designation given to aluminum by the President of the Scranton Board of Trade, in an address before that body. Possessing all the good qualities of iron without its weakness, it will, he thinks, in time totally replace that, at present, most useful of metals. Aluminum is now principally used in alloys. But its resistance to oxidation eminently fits it for household utensils, its lightness compared with its bulk makes it very suitable for architectural purposes, and its use in building steamships, and furnishing railways with their rolling stock, would revolutionize present rates of travel. It is a much better conductor than iron, and would replace that metal in telegraph wires; knives, swords and axes made of alloys of aluminum receive a much better temper than the finest steel. The great objection to the use of this metal, which is so abundantly diffused, has hitherto been the cost of reducing it from its ores. But President Price asserts that the price of aluminum is now only \$15 a pound, which is 50% less than it was thirty years ago; and a company in Cleveland claims that within the past year, by a new process, they have made it possible to reduce the price to \$4 a pound. If aluminum really possesses all these qualities in such a high degree, we may indeed prepare to witness new achievements, which will throw those already accomplished into the shade.

D. PHALEN.

Germanium.

Prof. Clemens Winkler, writing in a recent number of *Nature*, announces the discovery of a new element by himself. In the summer of 1885 a new mineral was discovered at Himmelsfürst, near Freiberg, in Saxony. This mineral was a rich silver ore, and received the name of *argyrodite*. Before the blow-pipe it yielded sulphur, silver, and a little mercury, in the following percentage: mercury 0.21 per cent., silver 73 to 75 per cent., sulphur 17 to 18 per cent. A small quantity of iron and traces of arsenic were also present. But there was always 6 or 7 per cent. un-

accounted for. Prof. Winkler claims to have discovered that this portion of the mineral contains a new element, which, in honor of his country, he has named *Germanium*. Germanium resembles antimony in its properties. The presence of arsenic and antimony in the minerals accompanying argyrodite made the discovery of the new element very difficult. On heating argyrodite in a current of hydrogen a black, crystalline and moderately volatile sublimate is formed, consisting of the sulphides of germanium and mercury. Germanium sulphide dissolves in ammonium sulphide and is precipitated in a pure state by hydrochloric acid. On heating germanium sulphide in a current of air, or warming it with nitric acid, a white oxide, non-volatile at a red heat, is produced. This oxide is readily reduced by hydrogen, but the reduction of the sulphide is more difficult on account of its volatility. Germanium, like arsenic, has a grey colour, and a moderate lustre. It is volatile only at a full red heat, but much less so than antimony. Its crystals could not be mistaken for those of the latter metal. The atomic weight of germanium, when ascertained, will show whether this element is to occupy the vacant place in the periodic system between antimony and bismuth.



COAL GAS.—It has been lately discovered that the heat value of coal gas has been rated too high, up to the present. A French chemist has ascertained that the real heat value is 15 per cent. below what it was thought to be, or 5,200 instead of 6,000 calories per cubic meter at 0°.

TIN.—Some of the supposed causes of the disintegration of tin are discussed in the *Mining and Scientific Press*. The idea of a dimorphesin is suggested by the fact that the disaggregated tin is of a lesser specific gravity than was the tin in its former state. The presence of mercury in the metal is another possible cause of its disintegration.

GEMS.—The *Jewelers' Journal* gives the following chemical directions for making artificial gems. To make the *sapphire*, heat 4 oz. of aluminum oxide and 4 oz. of red lead to a red heat. When smelted add 10 grs. bichromate of potassium and 17 grs. cobalt oxide. Stir up well and keep cool. The *ruby* is produced by the following process: Heat 4 oz. of aluminum oxide and 4 oz. of red lead to the smelting point, and add from 7 to 16 grs. of potassium bichromate. For the *emerald*, to the same quantity of oxide of aluminum and red lead, add from 8 to 12 grains of sodium uranite, and treat as above. Parisian or Alaska *diamonds* are made by heating 65 per cent. of pulverized crystal quartz, 20 per cent. of red lead, 8 per cent. of pure carbonate of potash, 5 per cent. of boric acid, and 2 per cent. of white arsenic. The brilliancy of the diamonds depends upon the purity of the red lead and of the carbonate of potash.

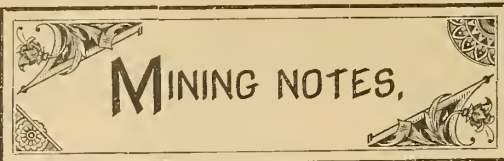
COPPER AND NITROGEN.—M. Blendlot, of the French Academy of Sciences, has observed a curious phenomenon with respect to the action of nitrogen on copper. A disk of platinum and a disk of copper, 0.03 meter in diameter, were placed 3 or 4 millimeters apart, under a bell jar of porcelain open below, and were fixed vertically in front of each other by means of platinum stands. The whole apparatus was then heated for three hours by a gas furnace.

At the end of that time, although there had been no electric current, the face of the platinum disk was found blackened with a deposit containing copper and platinum. In short, the copper had crossed over to the platinum. By repeating the experiment in a different gas, M. Blendlot ascertained that the nitrogen of the air had been the agent of the transfer by combining with the copper, which it afterwards deposited on the platinum.

MELDOMETER.—Prof. Joly, of Trinity College, Dublin, has described, in *Nature*, an apparatus contrived by himself, by which he can determine or compose the melting points of minerals, and their behaviour at high temperatures, either alone or in the presence of reagents. To this apparatus, which is to be attached to a mineralogical microscope, he gives the name of meldometer. He says, "As I now use it, it consists of a narrow ribbon of platinum (2 mm. wide), arranged to traverse the field of the microscope. The ribbon, clamped in two brass clamps so as to be readily removable, passes bridgewise over a little scooped-out hollow in a disk of ebony (4 cm. diam). The clamps also take wires from a battery (3 grooves cells), and are adjustable; the resistance being placed in circuit, the strip can be raised in temperature to the melting point of platinum." The platinum strip is placed in the field of a 1" objective, and a wedge of tainted glass is used in photometrically estimating the temperatures, by extinguishing the field. Approximate estimations of the temperature are made in terms of the resistance of the platinum strip. These observations may be compared with the readings on the wedge, which are then used for ready determinations. The mineral is placed in small fragments near the centre of the platinum strip, and the current increased till the melting point is apparent. By means of this apparatus, Prof. Joly has melted beryl, orthoclase, and quartz, and discovered for the first time that the last fuses below the melting point of platinum.

BEAUTIFUL MARBLES IN ALGIERS.—The rediscovery of the ancient quarries where the beautiful antique marbles were obtained is interesting. An extensive quarry, covering two thousand acres, has been quite recently discovered in the province of Oran, near the Mediterranean coast, in Algiers. The deposit has been obtained by an Italian who has constructed roads and begun operations. The deposit contains giallo antico, breccia, and cipoline, besides black and white marble. These fine colored stones can be laid on the wharf at Oran for about one dollar a cubic foot. The beautiful yellow marble, giallo antico, has, until this late rediscovery, been unknown, save by the fragments found in Roman ruins two or three years ago.

AN IMPORTANT EXPERIMENT.—The mining public will be much interested in the results obtained from the experiments which are to be made by means of a dynamo to be set up on the Truckee river in Nevada to transmit thence the whole motive power of that stream—furnished by a Laffel turbine, with a full head of water, with 100 feet fall—to a receiving dynamo at Virginia City. Those engaged in this operation claim that in this way a motive power can be furnished at Virginia City for a hundred-stamp mill for \$200. At present, the daily cost of transporting Comstock ores from the mines to the mills on Carson river is \$1,000, nearly all of which will be saved by having the mills directly at the mines.



NOVA SCOTIA.

Considerable attention is now being directed to Lunenburg county as a promising gold field.

The Empress mine in Renfrew district produced 284 ounces of gold during the month of March.

Miners have been working on tribute at the Mount Uniacke mines and have been earning about \$75 per month per man.

It is stated that a rich streak has been struck in the Rawdon mines, and that one thousand ounces of gold were taken from it during the first two weeks of March.

The first clean up at the Crow's Nest mine, in the Sherbrooke district, Gaysborough county, showed a yield of 75 ounces of fine gold from 37 tons of quartz put through the mill.

At the Antimony Mines at West Gore, Hants County, two inclined shafts and one perpendicular have been sunk. The ore is at present hoisted by horse power, but it is the intention of the owners to put in steam hoisting gear. Forty men are now employed in the mine, and their number will be increased to 60 or 70. 100 tons of ore, valued at from \$50 to \$55 a ton, are shipped monthly to England via Halifax.

Those interested in the development of the gold mines of this province are anxious that the local government should incur the expense of sinking a shaft to the depth of 1000 or 1200 feet for the purpose of proving the continuity or recurrence of the "pay-streaks" in quartz veins. As no practical test has yet been made, and as there is good reason to believe that deep mining would pay, it is not unreasonable to ask for government aid in settling the question. The government receives a royalty on all the gold mined in the province, and would, therefore, be warranted in incurring the expense of so practical a test, in view of the possibilities which might result therefrom.

ONTARIO.

(Thunder Bay District)

It has been reported that the miners at *Rabbit Mountain* have come upon a very rich vein, but the report has not been verified.

At the *Huronian* mine the shaft is now down 200 feet and at this level the vein is six feet wide, and producing ore that mills \$20 a ton.

A mica deposit, situated about fifty miles west of Port Arthur, will probably be developed this Spring and its actual value ascertained.

At the East end of Silver Mountain a branch vein is being followed alongside the main one. It carries rich ore and is eighteen inches wide.

Steam drills, air compressors and miscellaneous machinery, arrived at the *Beaver* mine in March, and are probably in working order by this time.

Some fine ore is now in sight at *Silver Falls* mine but the work of development is not being driven as actively as the location deserves.

The main vein has been reached at East End Silver Mountain mine. It shows very rich and work is being vigorously pushed ahead.

Work is progressing favourably at *Crown Point* mine and the promising character of the ore warrants continued efforts being made towards further development.

The site on which the mill for the *Beaver* mine is to be erected is on Silver creek, in a position convenient to the *Beaver* and *Silver Creek* mines, and a tramway has already been located thereto.

Mr. Richard Crow has been engaged to operate the mill at the *Beaver* mine. This gentleman was employed last year by the Huronian Gold Mining Company, and proved himself a competent mill man.

Preparations have been in progress to open up four mining locations in Black Bay country along the line of the Canadian Pacific railway, between Loon Lake and Black Sturgeon river. These include three argentiferous galena veins.

BRITISH COLUMBIA.

About six miles of McCulloch creek is available for mining and it is thought several hundred miners will make good pay there during the coming season.

A large amount of eastern capital is finding its way into Big Bend country, and it is expected that the placer and quartz claims will be vigorously worked.

The Homestake company, who are working on the Tulameen fifteen miles above Granite creek, took out \$523 in gold for three days work the last week in March.

Until the water lowers in the creeks of the Semilkameen district it will be impossible to resume mining operations, and this is not looked for until the end of May, or later.

Mining on Granite Creek received a check in the beginning of April. Work had been in progress for some weeks when a warm spell caused a freshet, necessitating the suspension of mining for an indefinite time.

Camp creek, Cairn creek, French creek, Gold creek and McCulloch creek, in the Big Bend district, will be worked to some extent this season, and it is expected a lively camp will spring up near the mouth of McCulloch creek.

It was expected that bed-rock would be reached about May 1st on the Barrett claim which is located on McCulloch Creek, higher up than the Ophir Bed-Rock Flume Company's. The tunnel is in 600 feet.

Mr. D. Jordan, of San Francisco, who recently purchased a tract of coal lands contiguous to the Wellington mines, has been superintending the sinking of prospecting bores and the extension of the slope. He is well satisfied with the result of these operations up to the present time.

In accounting for the failures in quartz mining in the Cariboo district heretofore, it is said to be due to improper treatment of the pyritous quartz which is said to carry \$20 to the ton in

finely disseminated gold locked up in the sulphuret and which has been worked as free milling ore. Thus, for the want of concentrating machinery, the pyrites passed off, carrying the gold with it.

At a public meeting in Farwell in February it was decided to petition the Local Government to aid in improving the means of communication between the Big Bend mines and Farwell, including the construction of a waggon road from La Porte to Ground Hog Basin, at the head of McCulloch's Creek, so as to facilitate the transportation of machinery and supplies to the various mining camps.

The Ophir Bed-Rock Flume Company propose constructing a flume the entire length of their ground which extends for a mile and a half along McCulloch Creek, in the Big Bend district. Into this will be hydraulized the gravel for 100 feet in width down to bed-rock, 60 feet below the surface. The flume will be seven feet wide, through which it is intended that 1000 yards of earth will pass each twenty-four hours. The gravel prospects ten cents to the pan.

UNITED STATES.

Colorado is credited with a bullion product for 1885 of \$22,800,000, of which \$13,000,000 was silver, \$5,000,000 gold, \$4,000,000 lead, and \$500,000 copper.

The Ropes gold mine, Michigan, for the month of February, produced from bullion and concentrates, about \$3,000 in precious metal, averaging about \$6.50 per ton of rock treated.

The shipments of last season from the Quincy mine, Mich., to Detroit smelters, aggregated 7,091,765 pounds of mineral which yielded about 82.47 per cent., or 5,848,197 pounds, of refined copper, and gave a mining profit of \$229,895.45.

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**MINING REGULATIONS**

To Govern the Disposal of

Mineral Lands other than Coal Lands.**1886.**

THESE REGULATIONS shall be applicable to all Dominion Lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, iron, or other mineral deposits of economic value, with the exception of coal.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein, either by surface or subterranean prospecting, for mineral deposits, with a view to obtaining under the Regulations a mining location for the same, but no mining location or mining claim shall be granted until the discovery of the vein, lode, or deposit of mineral or metal within the limits of the location or claim.

QUARTZ MINING.

A location for mining, except for iron, on veins, lodes, or ledges of quartz or other rock in place, shall not exceed twenty acres in area. Its length shall not be more than three times its breadth, and its surface boundary shall be four straight lines, the opposite sides of which shall be parallel, except where prior locations would prevent, in which case it may be of such a shape as may be approved of by the Superintendent of Mines.

Any person having discovered a mineral deposit may obtain a mining location therefor, in the manner set forth in the Regulations which provide for the character of the survey and the marks necessary to designate the location on the ground.

When the location has been marked conformably to the requirements of the Regulations, the claimant shall, within sixty days thereafter, file with the local agent in the Dominion Lands Office for the district in which the location is situated, a declaration or oath setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as aforesaid; and shall, along with such declaration, pay to the said agent an entry fee of FIVE DOLLARS. The agent's receipt for such fee will be the claimant's authority to enter into possession of the location applied for.

At any time before the expiration of FIVE years from the date of his obtaining the agent's receipt, it shall be open to the claimant to purchase the location on filing with the local agent proof that he has expended not less than FIVE HUNDRED DOLLARS in actual mining operation on the same; but the claimant is required before the expiration of each of the five years, to prove that he has performed not less than ONE HUNDRED DOLLARS' worth of labour during the year in the actual development of his claim, and at the same time obtain a renewal of his location receipt, for which he is required to pay a fee of FIVE DOLLARS.

The price to be paid for a mining location shall be at the rate of FIVE DOLLARS PER ACRE, cash, and the sum of FIFTY DOLLARS extra for the survey of same.

Not more than one mining location shall be granted to any individual claimant upon the same lode or vein.

IRON—The Minister of the Interior may grant a location for the mining of iron, not exceeding 160 acres in area, which shall be bounded by north and south and east and west lines astronomically, and its breadth shall equal its length. Provided, that should any person making an application purporting to be for the purpose of mining iron thus obtain, whether in good faith or fraudulently, possession of a valuable mineral deposit other than iron, his right in such deposit shall be restricted to the area prescribed by the Regulations for other minerals, and the rest of the location shall revert to the Crown for such disposition as the Minister may direct.

The Regulations also provide for the manner in which land may be acquired for milling purposes, reduction works, or other works incidental to mining operations.

Locations taken up prior to this date may, until the 1st August, 1886, be re-marked and re-entered in conformity with the Regulations without payment of new fees, in cases where no existing interests would thereby be prejudicially affected.

PLACER MINING.

The Regulations laid down in respect of quartz mining shall be applicable to placer mining as far as they relate to entries, entry fees, assignments, marking of localities, agents' receipts, and generally where they can be applied.

The nature and size of placer mining claims are provided for in the Regulations, including bar, dry, beach, creek or hill diggings, and the RIGHTS AND DUTIES OF MINERS are fully set forth.

The Regulations apply also to

BED-ROCK FLUMES, DRAINAGE OF MINES, AND DITCHES.

The GENERAL PROVISIONS of the Regulations include the interpretation of expressions used therein; how disputes shall be heard and adjudicated upon; under what circumstances miners shall be entitled to absent themselves from their locations or diggings, &c., &c.

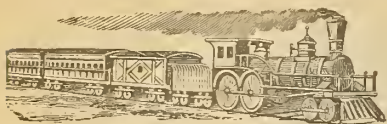
THE SCHEDULE OF MINING REGULATIONS

Contain the forms to be observed in the drawing up of all documents, such as:—"Application and affidavit of discoverer of quartz mine." "Receipt for fee paid by applicant for mining location." "Receipt for fee on extension of time for purchase of a mining location." "Patent of a mining location." "Certificate of the assignment of a mining location." "Application for grant for placer mining and affidavit of applicant." "Grant for placer mining." "Certificate of the assignment of a placer mining claim." "Grant to a bed-rock flume company." "Grant for drainage." "Grant of right to divert water and construct ditches."

Since the publication, in 1884, of the Mining Regulation to govern the disposal of Dominion Mineral Lands, the same have been carefully and thoroughly revised with a view to ensure ample protection to the public interests and at the same time to encourage the prospector and miner in order that the mineral resources may be made valuable by development.

COPIES OF THE REGULATIONS MAY BE OBTAINED UPON APPLICATION TO THE DEPARTMENT OF THE INTERIOR.

A. M. BURGESS,*Deputy Minister of the Interior.*



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DEPARTMENT OF INLAND REVENUE.

AN ACT RESPECTING AGRICULTURAL FERTILIZERS.

THE public is hereby notified that the provisions of the Act respecting AGRICULTURAL FERTILIZERS came into force on the 1ST OF JANUARY, 1886, and that all Fertilizers sold thereafter require to be sold subject to the conditions and restrictions therein contained—the main features of which are as follows:—

The expression "fertilizer" means and includes all fertilizers which are sold at more than TEN DOLLARS per ton, and which contain ammonia or its equivalent of nitrogen, or phosphoric acid.

Every manufacturer or importer of fertilizers for sale, shall, in the course of the month of January in each year and before offering the said fertilizer for sale, transmit to the Minister of Inland Revenue, carriage paid, a sealed glass jar, containing at least two pounds of the fertilizer manufactured or imported by him, with the certificate of analysis of the same, together with an affidavit setting forth that such jar contains a fair average sample of the fertilizer manufactured or imported by him; and such sample shall be preserved by the Minister of Inland Revenue for the purpose of comparison with any sample of fertilizer which is obtained in the course of the twelve months then next ensuing from such manufacturer or importer, and which is transmitted to the chief analyst for analysis.

If the fertilizer is put up in packages, every such package intended for sale or distribution within Canada shall have the manufacturer's certificate of analysis placed upon or securely attached to each package by the manufacturer; if the fertilizer is in bags, it shall be distinctly stamped or printed upon each bag; if it is in barrels, it shall be either branded, stamped or printed upon the head of each barrel, or distinctly printed upon good paper and securely pasted upon the head of each barrel, or upon a tag securely attached to the head of each barrel; if it is in bulk, the manufacturer's certificate shall be produced and a copy given to each purchaser.

No fertilizer shall be sold or offered or exposed for sale unless a certificate of analysis and a sample of the same shall have been transmitted to the Minister of Inland Revenue, and the provisions of the foregoing sub-section have been complied with.

Every person who sells, or offers or exposes for sale, any fertilizer, in respect of which the provisions of this Act have not been complied with, or who permits a certificate of analysis to be attached to any package, bag or barrel of such fertilizer, or to be produced to the inspector, to accompany the bill of inspection of such inspector, stating that the fertilizer contains a larger percentage of the constituents mentioned in sub-section No. 11 of the Act than is contained therein, or who sells, offers or exposes for sale any fertilizer purporting to have been inspected and which does not contain the percentage of constituents mentioned in the next preceding section, or who sells or offers or exposes for sale any fertilizer which does not contain the percentage of constituents mentioned in the manufacturer's certificate accompanying the same, shall be liable in each case to a penalty not exceeding fifty dollars for the first offence, and for each subsequent offence to a penalty not exceeding one hundred dollars: Provided always, that deficiency of one per centum of the ammonia or its equivalent of nitrogen, or of the phosphoric acid, claimed to be contained, shall not be considered as evidence of fraudulent intent.

The Act passed in the forty-seventh year of Her Majesty's reign, chaptered thirty-seven and intitled "an Act to prevent fraud in the manufacture and sale of agricultural fertilizers," is by this Act repealed, except in regard to any offence committed against it or any prosecution or other act commenced and not concluded or completed, and any payment of money due in respect of any provision thereof.

A copy of the Act may be obtained upon application to the Department of Inland Revenue.

E. MIALL,
Commissioner.



NOTICE.

SEALED TENDERS addressed to the undersigned and endorsed "Tender for Indian Supplies" will be received at this office up to noon of **TUESDAY, 20th APRIL, 1886**, for the delivery of Indian Supplies during the fiscal year ending 30th June, 1887, consisting of Flour, Bacon, Beef, Groceries, Ammunition, Twine, Oxen, Cows, Bulls, Agricultural Implements, Tools, etc., duty paid at various points in Manitoba and the North-west Territories.

Forms of Tender, giving full particulars relative to the Supplies required, dates of delivery, &c., may be had by applying to the undersigned, or to the Indian Commissioner at Regina, or to the Indian Office, Winnipeg.

Parties may tender for each description of goods (or for any portion of each description of goods) separately or for all the goods called for in the Schedules.

Each tender must be accompanied by an accepted Cheque in favour of the Superintendent General of Indian Affairs on a Canadian Bank for at least five per cent. of the amount of the tenders for Manitoba and the North-west Territories, which will be forfeited if the party tendering declines to enter into a contract when called upon to do so, or if he fails to complete the work contracted for. If the tender be not accepted the cheque will be returned.

Tenders must be made up in the Money column in the Schedule the total money value of the goods they offer to supply, or their tender will not be entertained.

Each tender must, in addition to the signature of the tenderer, be signed by two sureties acceptable to the Department, for the proper performance of the contract.

In all cases where transportation may be only partial by rail, contractors must make proper arrangements for supplies to be forwarded at once from railway stations to their destination in the Government Warehouse at the point of delivery.

The lowest or any tender not necessarily accepted.

L. VANKOUGHNET,

Deputy of the Superintendent-General
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Dept. of Indian Affairs,
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CANADIAN MINING REVIEW

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1886—OTTAWA, JUNE—1886

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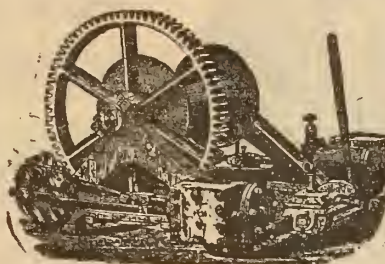
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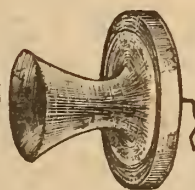
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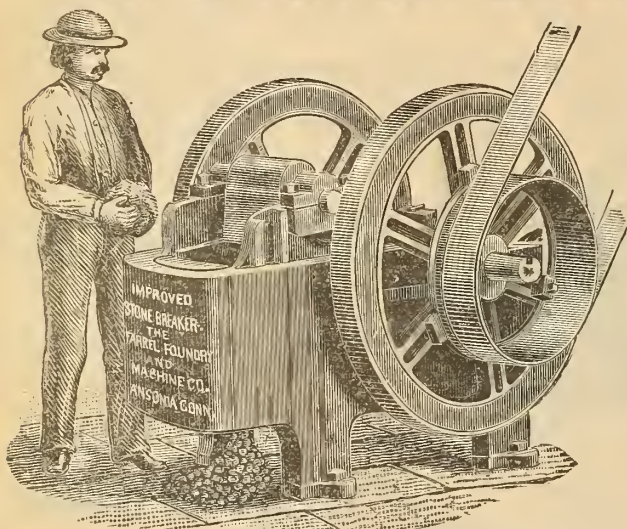
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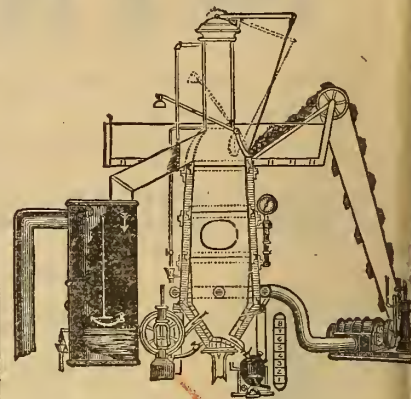
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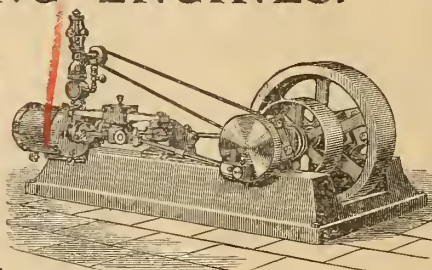
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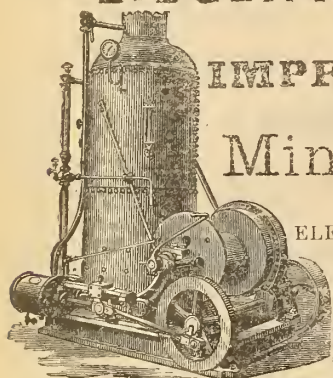
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Specifications can be seen and Forms of Tender obtained on and after Tuesday, the 15th inst., at this office, where all necessary information can be had on application; also at the office of James Nelson, Architect, Montreal, and at the Dominion Public Works Office, Post Office Building, Quebec.

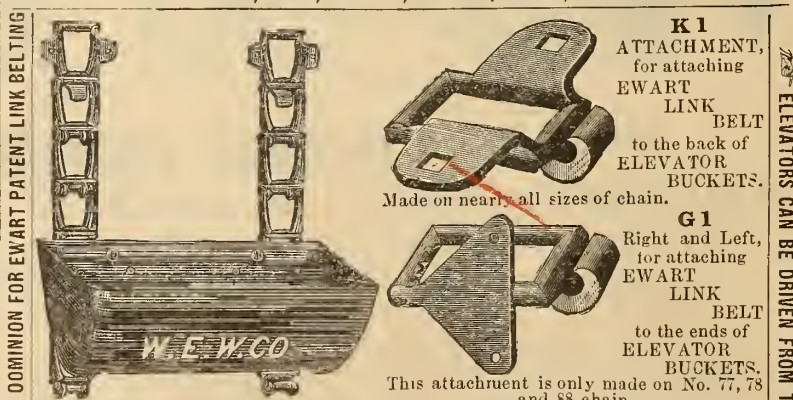
Each tender must be accompanied by an accepted bank cheque made payable to the order of the Honourable the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party decline to enter into a contract when called upon to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

By order,

A. GOBEL,
Secretary.

Department of Public Works,
Ottawa, 7th June, 1886.

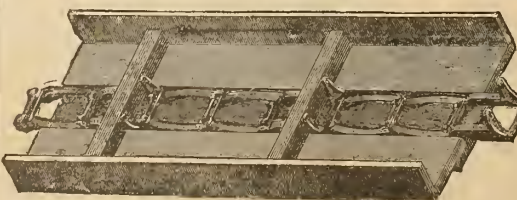
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P. O. Inspector

Post Office Inspector's Office,
Ottawa, 20th May, 1886.

Canadian Mining Review.

OTTAWA.

PUBLISHED MONTHLY.

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ADVERTISING RATES—15c. per line (12 lines to 1 inch).

OFFICE:

UNION CHAMBERS, 14 Metcalfe Street.

The CANADIAN MINING REVIEW is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts as well as others interested in Canadian Mineral Lands are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 20th of the month.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

It is not to be expected that the work of collecting and compiling information and statistics in connection with Canadian mines and minerals can be done in a manner that will be acceptable to the mining public until such time as a distinct branch has been added to the Geological Survey for this purpose.

Messrs. Coste and Ingall, the two Mining Geologists of the Survey, have been entrusted with this important work, and what these gentlemen will do in the direction of organizing and conducting a mining and mineralogical department will no doubt be well done; but their united efforts will be inadequate to supply the mining community with the desired information within the next decade of years, if ever, unless efficient assistants are appointed under them and they themselves are allowed to devote their whole attention to the work. At the present moment these gentlemen are pursuing their geological research in the field and will continue to do so during the summer months, after which they must prepare their reports and maps. Meanwhile no progress is being made with mining statistics. If there is to be such a thing as a mining and mineralogical department attached to the Survey, it must be established on a permanent basis with an adequate and efficient staff under one officer. Then, and not until then, may we look for such organization as will produce the end aimed at, and furnish us with the information so urgently needed by the mining public and of such vital importance to the country at large.

Professor Chapman, of Toronto, visited Ottawa recently on his return from the Beauce gold district where he had spent several days examining the property now being worked by the St. Onge Gold Mining Company. He expressed himself highly pleased with what he had seen and greatly astonished at the richness of the ground, and is firmly of the belief that gold mining will pay largely if properly conducted. He witnessed the washing of gravel from one of the drifts from the main shaft, from which a quantity of coarse gold was obtained, the nuggets varying in size from that of a pea to a bean.

Dr. Robert Bell, Assistant Director of the Geological Survey, will shortly proceed to Hudson Bay, where he will prosecute further exploration in the interest of mineralogy, geology and science. He will go by the overland route and will be absent for some months. Dr. Bell has already furnished the Geological Survey with a vast amount of information on the mineral resources of that far north country, acquired by personal observation. He has given a great deal of attention to portions of the Hudson Bay mainland, and has suffered hardships in order that his researches might be of practical service to the public.

Mr. A. C. Lawson will leave Ottawa during this month to continue his survey of the Rainy Lake district and will be absent for the rest of the summer. Mr. Lawson's report of that section of country will be published in a complete form in the next Report of Progress of the Geological Survey, and, as his work is always thoroughly and well done, his report will undoubtedly abound in interesting information.

Mr. Eugene Coste, Mining Geologist for the Geological Survey, is at present engaged in the mining district of the County of Hastings and expects, during the summer, to complete his examination of that section, begun last year. Mr. Coste's report will be looked for with much concern as it will no doubt be replete with interesting mining statistics and valuable information bearing on the mineral resources of the Hastings district, where rich gold-bearing veins and extensive iron ore deposits are known to exist.

Mr. E. D. Ingall, the other Mining Geologist of the Geological Survey is now in the Port Arthur district continuing his last year's survey of the Thunder Bay mining region in order that he may be enabled to complete a geological map of that interesting section of country and make an exhaustive report of its mineral resources. Mr. Ingall will have an opportunity of inspecting some of the mining properties in the neighborhood, and we earnestly hope he will collect statistical information of work done and such other information as will enable outsiders to form an intelligent idea of the possible future of the north shore of Lake Superior as a mining section.

The Gold Commissioner of Cariboo, B.C., in his annual report for 1885 to the Minister of Mines, states that in his district another year has passed without any material development of the quartz ledges, and, with the exception of the efforts put forth by the Quesnelle Quartz Mining Company, nothing had been attempted in this direction. The Quesnelle company were, he states, making a most laudable attempt to prove the value of their mine at Hixon Creek, and had purchased an engine and other machinery at San Francisco and engaged the services of experienced Californian quartz miners.

In our next issue we will publish a report of Mr. G. A. Koch, addressed to the Trustees of this company, which is highly satisfactory, and goes to show that at no distant day we may receive the intelligence that a valuable mine has been developed in this out of the way district, which will be an important gold producer. Mr. Koch, the present manager for the Quesnelle Quartz Mining Company, was temporarily engaged last year at the *Huronian* gold mine, Lake Superior district, and the work he accomplished there gave ample evidence of his ability to successfully conduct the development of a mining property.

The *Iron Trade Review*, of Cleveland, Ohio, one of our most valued exchanges, has done us the honour of reprinting an article which appeared in the editorial columns of our last issue on the *Morrison Tariff*, and in so doing prefaced it with the following complimentary notice:

"Our excellent contemporary, the CANADIAN MINING REVIEW, is possessed of a degree of frankness which is to be envied in this day of deceit and dissimulation. It would be pleased to see the United States open its markets to Canadian iron ore and coal, for the very simple and obvious reason that such an arrangement would benefit Canada first, last and all the time, and it isn't afraid to say so. At the same time it doesn't hope much for any substantial aid from the advocates of Free Trade, either in this country or in England."

And we are yet of the opinion that the Dominion of Canada would benefit by such an arrangement, whatever might be the result to individual interests. Now, would it not be in order for the *Iron Trade Review* to adopt for a brief spell, that degree of frankness for which it so highly commends us? We would be pleased if it would condescend to come down from its lofty pinnacle of patriotic virtue to *hard pan* and favor us with an unbiassed opinion as to how Mr. Morrison's tariff bill, in its entirety, would affect the interests of the United States as a nation. If the *Review* were quite unprejudiced by local interests we think it would agree with us in the belief that the benefits to accrue from reciprocity in iron ore and coal between the United States and Canada would be very evenly shared by the two countries.

Want of space compels us to hold over for our next issue an interesting article by Mr. E. J. Ball, Ph. D., London, England.—"Notes on the Progress of Mining in Europe."

THE PHOSPHATE TRADE.

Since our last report on the phosphate industry of Ottawa county the transportation of ore from the mines to the railway terminus at Buckingham, and thence to Montreal over the Canadian Pacific Railway, has been pushed with great activity. The Rivière du Lièvre, dotted with ore vessels plying between the mines and the landing at Buckingham, presents a busy scene, and although there has been a large accumulation of ore since the close of navigation last year the increased carrying facilities on the river insure its delivery at point of shipment early in the season. As will be seen by our statement of shipments for May, some phosphate was forwarded from Montreal during that month to Liverpool and Hamburg, the amount, however, being but 1,562 bags ground phosphate and 737 tons crude. The first shipment for the year was on May 12th per SS. *Kehweider* to Hamburg. Last season the first shipment was to Liverpool per SS. *Sarnia* on May 21st, and the shipments for the month aggregated 1,393 tons, all crude. Thus it will be seen that between May 21st and 31st in 1885 the shipments of crude phosphate exceeded those of this year from 12th to 31st of May by 656 tons. This is accounted for by the present unsettled condition of the fertilizer market in England and on the Continent and by the fact that miners show no desire to sell and are not offering their output at present prices. There has been some uncertainty with regard to ocean freight, which has, in a measure, checked the forwarding of phosphate. Miners are not uneasy as to the prospects for the future and are sanguine that the fertilizer market abroad will recover later in the season and that better prices will be obtainable for Canadian phosphate, which is always more or less in demand. They are also hopeful of securing lower freight rates than are being offered at the present time, and they have good reason to expect this. Meanwhile the ore is finding its way to Montreal in large quantity and will there remain ready to be forwarded when sold. It is not improbable that in future a large quantity of ground phosphate will be shipped to Hamburg and other European ports, and that there will henceforth be a large and increasing demand in the United States for Canadian phosphate in a ground state is already assured.

The Portland (P.Q.) Phosphate Mining and Milling Company have taken orders that will tax their mill to its full capacity for several months. This company's mill is one of the most complete of its kind in America and performs its work in a most satisfactory manner. The several operations to which the ore is subjected reduce it finally to an impalpable powder and by ingenious contrivances a large percentage of the foreign matrix is expelled, thus bringing up the percentage of tribasic phosphate of lime several units. The mica extracted in this manner is saved and sold at a fair price. In the last issue of the REVIEW we reported sales of 4,000 tons of ground phosphate for the Buffalo, Cleveland and Chicago markets. This, according to newspaper reports, has been magnified to 10,000 tons, but we have received no verification of these figures and are not inclined to think that any such quantity has been sold. This would represent quite one-third of

the entire year's production, besides which the capacity of the mill is only 40 tons per day, and if worked night and day it could not grind 10,000 tons in less than six months, all things considered.

THE MINES.

The force of miners employed in the *du Lièvre* district has not varied since the winter and the mines are yielding ore in abundance. *High Rock*, the *Union* mines, the *North Star*, the *Little Rapids* and the *Emerald* have large reserves of ore in sight and at other mines in the district important developments have been made. At the *Glasgow-Canadian* mine in the Township of Derry, the shaft is now down 140 feet cutting two parallel veins, one of green and the other of red and green phosphate, aggregating about six feet of mineral. The ore is of very high grade and appears to be comparatively free from impurities. Another instance of successful deep mining is at the *Battle Lake* mine where a large body of ore has been laid bare in the bottom of the main shaft. The ore here is also very pure and the manager is of the opinion that all the small veins in the vicinity of the shaft are feeders to this ore body. This last mentioned mine is in the Township of Templeton and has recently been acquired by the Anglo-Canadian Phosphate Company. The McLaurin mine in Templeton continues to occupy a place on the list of heavy producers, and many less important mines in the County of Ottawa are contributing to the output of the district.

Important mining operations are going on at the phosphate mines in the Perth district. Messrs. Wilson & Green, of Montreal, are opening up a very promising location in North Burgess in the interest of an English company. Suitable machinery has been erected on the property which, it is expected, will develop into a rich and valuable mine. The Anglo-Canadian Phosphate Company are also preparing for extensive operations on the tracts of phosphate land they have acquired in this district. A much larger quantity of phosphate will be forwarded from the Perth district during this season than was forwarded last year.

Phosphate Quotations.

Comparatively little phosphate has yet been sold for shipment and owners are holding back. Shippers report that at the prices asked by miners, little business can be done. Miners, on the other hand, cling to the belief that prices will stiffen, and are not disposed to sell at the present ruling quotation of *one shilling* for 80 per cent. with a fifth of a penny rise. London brokers report that they can sell Canadian mineral phosphate at 1s. for 80 per cent., ex ship London or Liverpool, and the lower grades, viz., 75, 70 and 65 per cent., at correspondingly lower prices. South Carolina, and in fact all mineral phosphates, have been selling at lower prices than last year, notwithstanding that manufacturers are delivering largely to farmers. The present sluggish condition of the market in raw material is partly due to the season being a late one.

PHOSPHATE SHIPMENTS FROM MONTREAL FOR MAY 1886.

Date.	Vessel.	Destination	Shippers or agents.	Tons.
May 25	S.S. Oxenhalome	Liverpool.	Wilson & Green....	387
"	"	"	Lomer, Rohr & Co	350
May 12	S.S. Kehweider.	Hamburg.	W. M. Knowles	*1562 bags

*Ground phosphate.

Ocean Freight.

Shipping brokers of Montreal expressed some uneasiness after the opening of navigation in the St. Lawrence, on account of apparent uncertainty of freight rates for phosphate transportation. This, however, appears now to have been unfounded, as we learn of shipments having already been made at three to four shillings per ton to Liverpool, and future shipments have been contracted for at similar rates. The ruling ocean freight rate for phosphate for this season will, in all probability, be much the same as for 1885, viz: about five shillings and sixpence per ton.

Villeneuve Mica Mine.

During the past month the British and Canadian Mica and Mining Company have been actively opening up this valuable property and constructing a good waggon road from it to the Rivière du Lièvre. A commodious cutting-house has been established by the company in Buckingham Village, to which the mica is forwarded from the mine in sacks after having been carefully examined and split into convenient thicknesses. Experienced cutters have arrived from Franklin, North Carolina, until now the headquarters of the mica industry, and a number of boys and women are employed to split the mica for the cutters and to clean it when cut into sizes preparatory to sorting and packing it into 1 lb. packages for the market. The daily production of the *Villeneuve* mine will soon reach one hundred pounds of merchantable mica, which will be considerably in excess of that of any other individual mica mine on this continent. We purpose giving a full description of this mine in our next issue.

Oil Discovered.

Some excitement has been caused by the discovery of oil wells four miles from Shequandah on Grand Manitoulin. On May 17th, while a number of men were boring under the supervision of Mr. W. Thomas Newman they struck oil at a depth of 58 feet. It spouted out in a clear stream over the heads of those who were drilling. They continued boring, and at a depth of 75 feet came upon a vein of mineral water, iron and silt, from which there was a strong flow of gas. Mr. Newman then proceeded to Toronto, taking samples with him, and has since purchased tanks and pumps and will put down the latter as quickly as wells can be bored. Upwards of 14 tons of machinery are already on the ground and it is the intention to continue boring to a depth of 300 to 400 feet. The oil met with at 58 feet is surface oil of a very valuable description and peculiarly suitable for machinery.

COAL IN FRANCE.—The output of coal in France in the second half of last year was 10,157,630 tons. This total presents an increase of 780,919 tons, as compared with the output in the first half of 1885. The production of coal in France for the whole of 1885 was 19,534,341 tons, as compared with 20,023,514 tons in 1884.

DISCOVERY OF QUICKSILVER MINES IN RUSSIA.—A very important discovery of cinnabar mines has been recently made in the mining region of the Don, Russia. The ore is stated to contain from 69 to 80 per cent. of pure mercury.

MINES NORTH OF LAKE SUPERIOR.

PORT ARTHUR DISTRICT.

Work was resumed at the *West End* mine (Silver Mountain) about the end of April and a tunnel started at the foot of the mountain towards the vein which will be utilized for drainage purposes. The vein proper has prospected well and promises to develop into a rich silver mine. Its outcroppings are visible for several feet along the surface.

At the *East End* mine work on the vein is progressing satisfactorily, and its owners are much encouraged by the manner in which the vein is developing. It is steadily improving in extent and richness, and several large nuggets of pure silver, one weighing three pounds, have been taken out. The richest part of this vein is not more than 1,000 ft. from the vein on which the Cleveland company did some prospecting, and the opinion prevails that, had better judgment been exercised, the Cleveland men would not have abandoned the location. A recent visitor to Silver Mountain reports having seen very rich silver ore taken from the drift where the Cleveland company formerly worked, and pronounces the vein at this point to be well impregnated with native and black silver.

Crown Point mine has come to the front and is likely to become one of the important producers of the district. The miners are working in two drifts, one at the base of the mountain and the other directly above it, both on the vein which is unquestionably a true fissure. The ore from the upper portion of the vein has been shown by assay to be very rich, but recent development has produced ore from the lower drift which is said to be much more heavily mineralized. A very rich streak has been encountered which shows abundance of silver and has created quite an excitement among the miners. As far as the vein has been worked on it shows silver well disseminated and occasional very rich streaks, some of the vein matter containing nuggets varying in size up to one and a half inch long. Most recent advices report that at the point of contact of three feeders with the vein proper much native silver is visible. This mine is owned by mining men of St. Louis and other western cities who have ample capital at their disposal. It is their intention to greatly increase the number of miners so soon as sufficient ground has been opened to admit of a larger force being employed.

On location "223," at the north end of Silver Mountain, a considerable amount of development work has been done with encouraging results. A tunnel has been driven for upwards of 400 feet and a shaft put down 40 feet. Native silver has been met with at several points and the present appearance of the vein has inspired its owners with confidence. Assays of the vein matter have given large quantities of silver and the location promises to increase in value as work progresses. About twenty miners are now employed on night and day shifts, but their work has been somewhat retarded by water, which is coming in very rapidly.

Latest advices from the *Beaver* mine report that the air-compressor and steam-drills were nearly ready to start work. The lighter parts had been brought on the ground, but the delivery of the heavier machinery would be delayed until the road to the mine, which was in an almost impassable condition, had been improved. A large force has been steadily engaged at the *Beaver* mine and a great deal of important development work has been accomplished.

Work at *Rabbit Mountain* mine is being energetically pushed and great results are anticipated after the mill has been in running order. The machinery is all on the ground and will be put in place so soon as the mill is erected, which is now rapidly approaching completion.

Recent work at *Silver Falls* mine has exposed a good-looking vein dipping to the north at an angle of 35°. The vein is 5 feet wide, is well charged with mineral and promises well.

JARVIS ISLAND MINE,

Thunder Bay District,

TO BE WORKED BY A NEW COMPANY.

In our last issue we published a letter from "A Miner" in which our correspondent referred to this property in the following words: "*Jarvis Island* was worked and tested to a depth of 130 ft. and found to carry native silver and silver ore, and when abandoned there was a good show of silver. The owners of the property intend, I believe, to start work again this spring." We are now in receipt of the report of the directors of the company, to be submitted to the shareholders at a meeting to be held in London, Eng., on the 15th inst. The report is as follows:—

"In placing the accounts before the proprietors, the directors have to announce that they have decided to make a change in the constitution of the Company.

Subject to the approval of the shareholders, they propose to dispose of the whole assets of the existing concern to a new Company, to be entitled, "The *Jarvis Silver Mining Company, Limited*," with a capital of 90,000 ordinary shares and 10,000 preference shares of £1 each; and it is proposed that of the ordinary shares ten fully paid shall be given for each £10 share in the existing Company.

This plan is in substitution of the recent proposal to raise capital by means of a development company, which would have involved the sacrifice of one-third of the Company's property.

The present proposal is more advantageous to the shareholders, who will have the first offer of the preference shares at such price as it may be decided at the meeting to issue them.

Since the meeting a report has been received of the rendering at New York of seven cwt. of samples of the silver ore (poor and rich) taken from the mine, with results that fairly confirm the assays of which you have been informed.

The actual result was 134½ dols. to the ton of ore, after deduction of the loss in extraction, which is of course greater in putting a small quantity through a mill, owing to the impossibility of making a perfect cleaning up.

The experience of the neighboring *Silver Islet* mine was stated to be that ore of 10 dols. value per ton, passed through the same kind of mill, yielded nearly half profit.

It is therefore evident that should sufficient ore be found, the *Jarvis* will prove a very valuable mine.

The evidence of miners employed when the mine shnt down is very encouraging, and all agree that when the mine was stopped for want of funds, by order of the board here, it gave every indication of proving most valuable.

The deepest working where the best ore was found was 146 feet, and as the water was easily kept down by a bucket worked by a horse, the unwatering with an engine and pump will only be the work of a few days.

The shareholders must be reminded that besides the island on which the rich ore was discovered there are 6,400 acres (freehold) on the

mainland two miles off, having much valuable wood, and several outcrops of mineral veins, embracing, moreover, one of the best natural harbors on Lake Superior, so that apart from the promising mine already opened, there is a substantial basis of value unburdened by debt.

It is proposed to wind up the present company and to appoint Mr. William Cash as liquidator at a remuneration of £100 for his services.

MINERAL RESOURCES

OF

NOVA SCOTIA.

Continued from page 5, Vol. 4, No. 4.

Iron Ores.

This, perhaps the most important of Nova Scotia's mineral resources, has not as yet received attention commensurate with its value. The ores are of the most varied species and frequently very pure. They are generally accessible, near water or railway transport, and none of them at any great distance from coal. Beginning at the western end of the province, titaniferous iron sand is met at St. Mary's Bay, and the trap rocks forming the south side of the Bay of Fundy yield abundant indications of specular and magnetite. At Clementsport and Nictaux are beds of red hematite and magnetite, formerly worked to a small extent in charcoal furnaces. From this point, as far west as Windsor, specular, red hematite and bog ores are found, but little is known of their extent or value. Similar ores, sometimes highly manganeseiferous, are found between Windsor and Truro, at Goshen, Maitland, Brookfield, etc.

The following analysis of limonite from the last mentioned place shows very pure ore:

Water.....	11.36
Silicious matter.....	1.54
Phosphoric acid.....	trace
Sulphuric acid.....	none
Magnesia.....	trace
Metallic iron.....	60.00

On the north side of the Bay of Fundy the limonite ores of Londonderry are well known. Their passage has been traced for fifty miles along the range of the Cabequid Hills, and they have been worked for many years at the Acadian mines. Large amounts of a variety of spathic ores are mined and smelted with the limonite, and a good grade of pig made, part of which is converted into bar iron, etc. There are two large blast furnaces, with rolling mills, foundries, etc., and from 40,000 to 60,000 tons of ore are annually smelted. The following analyses show the character of the iron ores of the Acadian mines:—

	Micaceous Hematite.	Limonite.
Per oxide of iron.....	96.93	82.65
Oxide of magnesia.....	....	.25
Alumina.....	.33	.56
Lime.....	.04	.15
Magnesia.....	.11	.10
Phosphoric acid.....	.07	.38
Sulphuric acid.....	.03	.02
Water hygroscopic.....	.03	.31
Water combined.....	.79	10.51
Insoluble.....	1.26	4.79
Metallic iron.....	67.85	57.85

SPATHOSE ORES.

Insoluble silicious matter.....	.47
Calcic carbonate.....	.59
Ferrous.....	69.20
Manganous.....	1.37
Magnesian.....	28.73
Ferric oxide.....	.08

Iron ores are known at Pugwash, Wallace, Joggins, Clark's Point, etc., north of the Cabequid Hills.

The Londonderry iron ore bearing ground passes north of Truro and extends into Pictou county, and may be said to terminate at Cape George in Antigonish county. On entering Pictou county near the line of the Intercolonial railway are met widespread indications of specular ore, which, at several points, show veins of workable size. This specular ore ground extends to the head of the East River, a distance of about twenty miles, and carries ore veins which attain a thickness of fifteen feet. South of this band are deposits of limonite ores, which, however, are yet little known. In the vicinity of Springville, between the specular ore and the Pictou coal field, are large and valuable beds of limonite, sometimes highly manganiferous, and bedded red hematites attaining a thickness at some points from 20 to 40 feet. On Sutherland's river these ores approach the eastern end of the coal field, one ore bed, fifteen feet in width, being not more than two miles from Vale colliery. An exposure of a bed of red hematite three feet thick at Arisaig marks the termination of this district, which is fifty miles long, and attains a maximum width of six miles. Clay ironstone is met at several points in the Pictou coal field and between New Glasgow and Pictou.

The following analyses serve to show the character of the Pictou iron ores:—

	Limonite	Clay Iron Stone.	Specular.	Red Hematite
Water.....	7.702	2.132	.....	.....
Iron Peroxide..	87.925	45.361	97.52	65.26
Alumina.....	Trace..	16.962	.....	5.59
Silica.....	3.000	.780	3.20	25.68
Manganese Bin- oxide.....	Trace..	.....	.....	.....
Lime.....	.....	Trace..	.91	1.88
Magnesia.....	.500	1.655	.....	1.05
Sulphur.....	Trace..	.612	.06	.....
Phosphorous...	.....	Trace..	Trace..	.....
Metallic iron...	65.540	35.000	68.33	43.40
Carbonic acid..	.....	.....	.....	.....

The following analyses is of the spathic ore from Sutherland's river:—

Sesquioxide of iron.....	20.52
Carbonate of iron.....	57.40
“ of manganese.....	8.29
“ of lime.....	4.02
“ of magnesia.....	5.66
Silica.....	2.38
Moisture.....	1.43
Sulphur.....	none
Phosphorous.....	none
Iron.....	42.07

In Pictou county the conditions for making iron and steel cheaply are most favourable, as within a few miles are collected numerous iron ores, fluxes and good furnace fuels, and there is railway and water communication with all parts of the Dominion.

In Cape Breton indications of valuable iron ores are frequently met, but hitherto there has been little inducement to test or develop them. Near East Bay a bed of red hematite ore from 4 to 13 feet wide has been traced several miles, specimens of which have been analyzed as follows:—

Iron peroxide.....	85.057
Silica.....	5.130
Sulphur.....	.075
Phosphoric acid.....	.032
Metallic iron.....	57.526

Gold.

The auriferous district of Nova Scotia stretches in an irregular band along its shore. Its area is estimated at about 3,000 square miles. The gold mines are scattered

through this band, the greater number being to the eastward of Halifax. The auriferous district is found to contain numerous veins of quartz from one inch to six feet in thickness, running continuously, in many cases, for miles. Nearly all these veins contain gold, but, as elsewhere, only a certain percentage of them are rich enough to work. They carry the gold in visible grains imbedded in the quartz, and in the various sulphides of copper, lead, iron, etc., invariably found in them. The width of the veins usually worked varies from four to twenty inches, but in some cases they are found to be highly auriferous when much wider.

These veins carry gold in amounts varying from a trace up to several ounces, and in common with auriferous veins of other countries, frequently present it in the form of “pay streaks” or rich zones in the vein. These “pay streaks” are of varied width and depth, and are frequently very rich. In the Sherbrooke district one of these deposits was followed to a depth of 600 feet. The quartz surrounding these richer portions of the veins varies in value from three to ten dollars a ton. Other veins again show a uniform yield, not exceeding one-half to three-quarters of an ounce to the ton for long distances.

Among the more prominent districts at the present time may be mentioned the Salmon River mines. Here work has been carried on for several years on a vein of quartz from three to six feet wide. Several shafts have been sunk to a depth of about 150 feet, and ore has been extracted from a portion of a vein about 900 feet long. The quartz is crushed in a stamp-mill driven by water power and placed about a quarter of a mile from the mine. There are eight batteries, each holding five stamps, weighing about 700 lbs. each complete. The average yield from the quartz has varied between seven dwts. and one ounce to the ton. Owing to the size of the vein and cheapness of the water power crushing, this ore could be profitably treated even if the value of the gold yield fell to five dollars, or say twenty shillings to the ton. Since the opening of the mine 33,253 tons of quartz have been crushed and yielded 18,047 ounces of gold. This can be taken as a sample of others now working in the province, but it will be understood that the narrower the vein the richer its contents must prove, as the expense of mining increases rapidly with the greater amount of dead work. At Montagu, Rawdon, Oldham, Stormont, and Lake Catcha profitable mining has been carried on during the past year.

The Inspector of Mines, in his annual report, expresses the opinion that the great future of gold mining in Nova Scotia lies in the so-called “low grade” ores. In many of the districts are found wide belts of slate and quartzite, intersected by quartz veins, both the veins and rocks being more or less auriferous. Trials on a working scale have been made of such ores as they occur in the province, and the field appears even more promising than in any other gold mining country.

A Quartz Milling Company Starts in Nova Scotia.

A new and important enterprise has been opened in Yarmouth, N.S. The British American Manufacturing, Mining and Milling Company have opened their works and put in one of their new electric rotary crushing mills, under the superintendence of Mr. J. F. Wiswell, of Boston, son of the inventor. The mill is now in operation and will crush twenty tons of ore

per day, and it is claimed will save from twenty to forty per cent. more gold than the ordinary stamp mills now used in the province. This mill has been put up by an American company who make Yarmouth the headquarters of their operations in Canada. They will have their mills manufactured by the Burrell Johnson Iron Company and will supply them at short notice to any part of the Dominion. The company purpose taking interests in mining properties and aiding in their development, besides handling quartz to order at their mill. Several lots of ore are now in the mill awaiting treatment, and if the crusher saves as large a percentage as is claimed, the value of the auriferous deposits of the Province will be greatly enhanced. The new mill is formed of four heavy iron wheels running in a groove and giving a continuous crushing surface with much less expenditure of power than that required by the stamp mills. A constant current of electricity from a powerful dynamo prevents “sliming” and greatly aids the process of amalgamation. The amalgam can be drawn off from a quicksilver trap at any time without stopping the mill. The mill is the first of the kind ever put up in Canada, and has been proved in many gold districts of the continent.

CORRESPONDENCE.

IRON SMELTING IN CANADA.

ST. IGNACE, MICH., U.S.,
May 12th, 1886.

Editor Canadian Mining Review,

SIR,—I received, a few days ago, from a friend in Toronto, the intelligence of the unfortunate termination of Messrs. Parry & Mill's enterprise in the blast furnace line, in the Madoc district; I also received a copy of the *Hamilton Times* containing a criticism on Mr. Bartlett's book (recently published by Dawson Bros, Montreal), and as it is evident, from the information given in your March number of the *REVIEW*, that Canadian mines and minerals are at last beginning to receive recognition of their value, I have thought that a letter from one deeply interested, as I am, in the prosperity of the country, and well acquainted with its peculiar difficulties in this department, might be of value to your readers.

The *Hamilton Times* styles, and perhaps rightly, the production of iron, “One of Canada's lapsed industries.” Why is it so? Mr. Bartlett lays the blame on defective legislation. Let us see if there is not some other cause. In the case of Mr. Van Norman, detailed in Mr. B's work, we find that he succeeded well in stove and brittle casting, making about 3 tons per day from bog iron ore. He afterwards purchased the Marmora works where he had a totally different ore which he knew nothing about, and so situated that it cost perhaps \$10 per ton to get it to market. Success could hardly be hoped for under such conditions, and no government would be justified in protecting such an industry. Mr. Van Norman's next effort was in a branch of blast practice, which was then in its infancy, namely, making car-wheel iron. He worked along evidently for some time, making no test of his product, till he had accumulated 400 tons, which, on being shipped to the car-wheel foundry, was found useless for that purpose. Had Mr. V. known anything about the business he would have found this out by the first cast taken from the furnace, and would then have either abandoned the works or have endeavoured to find some

ore which, mixed with his own ore, would give the required properties to the metal; in either case he would have avoided the loss incurred in making 400 tons of a product which had to be sold for less than its cost; this case is, I think, also beyond the help of legislation, and forms a fair example of these enterprises. Let us take the last case, that of Messrs. Parry and Mills. These gentlemen may, or may not, have understood the business in which they embarked. I am informed that owing to an unfortunate error of judgment they met with a heavy loss in the destruction of a portion of their plant; be that as it may, it is evident that they went into the business with insufficient capital, and that even had they completed their works they could not have withstood the slightest failure in the working of their furnace at the outset. My own experience in blast furnace work has taught me that to start a furnace in a new district with untried ores, it is necessary that the parties engaged in it should possess sufficient capital to enable them to stand from six to nine months unsuccessful running till they have learned how to mix their ores and what ores to use, in order to obtain the desired product. It is possible that they may succeed from the start, but the probabilities point the other way, and their iron for some time may be saleable only at the market price of ordinary coke iron (I am of course taking it for granted that a furnace located in central Canada would make charcoal iron) and they may even have trouble in producing that. None but the initiated can understand the difficulties in the way of making car wheel iron so as to obtain a product of the required strength which will not show "skin-chill," "chill-cracks," "manganese chill," etc., etc. And here is where, in my opinion, the Government might fitly, and at a very trifling cost to the country at large, assist the struggling furnace man by giving a sufficient bonus on the manufacture for a limited time till the work had passed the experimental stage, care being taken that this experimental stage was not fraudulently prolonged for the benefit of unprincipled parties interested in the enterprise.

The establishment of a bureau of mining and mineralogy is also an important step in the right direction, which, besides being an assistance to the mining industries, would help to remove one of the greatest difficulties in the path of Canadian iron manufacture. It is well known that there is an abundance of magnetic ore in Canada, it being easily discovered and traced out by the use of the dip needle, but to run a furnace successfully on car-wheel iron, it is necessary to have a mixture of magnetic, specular, and hematite ores. Respecting the deposits of the two latter ores, but little is known so far as I have been able to ascertain. I know of some deposits in Frontenac County, having examined some of them, as well as in other districts, but nothing sufficiently definite to satisfy a furnace man is yet known about them; so that until the mining bureau or some other agency throws light on the subject it will not be easy to get practical men to invest money in that line (furnace building). As regards the tariff, I consider protection an absolute necessity, but it may be over done and so induce rash and ignorant speculation.

SAMUEL D. MILLS,

Supt. Martel Furnace Co., St. Ignace,
Mich., (late of Kingston, Ont.)

GRANITE CREEK,

(British Columbia.)

LETTER FROM THE GOLD COMMISSIONER.

Promising Quartz Ledges in the District.

The following letter from Mr. G. C. Tunstall, addressed to the Minister of Mines, contains a warning to those who may be tempted to try their luck in the Granite creek diggings:

GRANITE CITY, April 21st, 1886.

The Honourable the Minister of Mines, Victoria, B.C.:

SIR,—I have the honour to inform you that the prevailing freshet on Granite creek and the Similkameen and Tulameen rivers has almost entirely suspended mining operations. The period between the present high water and the summer freshet will be of too short a duration to justify claim owners to repair their dams and flumes to again run the risk of having them swept away. The other creeks are still so much encumbered with ice and snow that it is probable no mining activity will be exhibited before the middle of June, or perhaps later.

This is a very unfortunate state of affairs for the district, as few of the new-comers can afford to remain idle, and many have left with reports of an unfavourable nature, calculated to encourage the belief that the mines are a partial failure. But confidence will be restored when the difficulties mentioned are removed.

Several promising quartz ledges have been taken up and recorded. The appearance of the ore is highly spoken of by persons experienced in that important branch of mining in Colorado and Arizona, and I think it would be advisable for the Government to have assays made *gratis* of the various samples I may forward for that purpose, in order to afford some definite idea of their value, and stimulate a search for the gold and silver bearing claims.

I have the honour to be, Sir,

Your obedient servant,

G. C. TUNSTALL,

Gold Commissioner.

The following extracts are from a letter of a more recent date from the Gold Commissioner to the Minister of Mines:

"I have the honour to inform you that a new creek named 'Boulder creek,' has been lately discovered. It crosses the Granite-creek-Nicola trail at a point about eleven miles north of this place (Granite City), and empties into Otter creek on the west side, near the head of the lake of that name.

FIVE PANS OF DIRT YIELDED FOUR DOLLARS. The prospect was obtained on a bench about thirty feet above the present channel. A number of persons have started with the intention of staking off ground.

* * * There are about

ONE HUNDRED AND FIFTY MEN

at work on the South Fork of Granite creek, concerning which sanguine expectations are entertained. The Spokane company are down 18 feet and daily expect to reach bed rock, the water is still at a high stage, and mining on the rivers and Granite creek is almost entirely suspended."

AUSTRALIAN COPPER AND TIN EXPORTS.—

During the month of March, the following were among the exports from Melbourne, Adelaide, Sydney, and Queensland to Great Britain: Copper, 800 tons; copper ore, 300 tons; and tin, 500 tons.

The Australian Gold Supply Continues to Decrease.

The result of gold mining in the Victoria gold fields for 1885 shows an output smaller than that of any year since 1852; that is to say, since within a year of the discovery of gold in that quarter. The year's product, as abstracted by the London *Mining Journal* from the official returns, is given by quarters as follows, we adding the value at the rate of £3 17s. 9d. per ounce or \$19.43 per ounce:

		ozs.	dwt.	grs.
Quarterly	March 31	192,438	11	15
"	June 30	154,377	15	10
"	Sept. 30	176,159	2	21
"	Dec. 31	181,582	16	6
Total weight		735,218	6	4
Value			\$14,285,285	

For the last quarter we append the table compiled from the estimates of ten mining registrars by districts:

Districts.	Alluvial.	Quartz.	Totals.
	ozs. dwt. grs.	ozs. dwt. grs.	ozs. dwt. grs.
Ballarat.....	34,500 13 18	22,741 11 21	57,242 5 15
Beechworth....	8,412 15 1	5,300 3 12	13,722 18 13
Sandhurst.....	1,372 12 13	47,562 13 21	48,935 6 10
Maryborough...	13,868 4 15	4,759 16 21	18,628 1 12
Castlemaine...	5,775 3 21	12,821 14 20	19,596 18 17
Araucan.....	4,994 14 20	2,040 17 14	7,035 12 10
Gipps Land....	2,054 17 4	14,366 15 21	16,421 13 1
Grand totals..	71,989 1 20	169,593 14 10	181,582 16 6

The following table shows the product of the same fields during the last ten years for the quarter ending December 31st, of each year:

Year.	Yield.	Year.	Yield.
	ozs. dwt. grs.		ozs. dwt. grs.
1876.....	228,640 5 1	1881.....	225,071 14 19
1877.....	218,159 3 14	1882.....	236,303 1 17
1878.....	206,058 0 8	1883.....	190,931 17 18
1879.....	209,411 7 7	1884.....	200,789 16 13
1880.....	228,628 8 20	1885.....	181,582 16 6

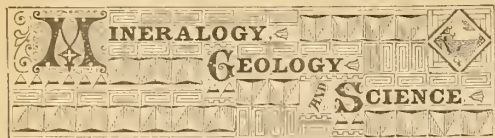
Thus, it is to be seen that there has been a decrease in the same quarter from that of 1880 of 47,045 ounces. The dividends paid by incorporated companies aggregated about \$2,885,000. This was exclusive of a considerable amount paid by privately worked enterprises that make no report of dividends.—*F. & M. Record.*

A Productive Australian Gold Mine.

The Long Tunnell Gold Mining Company, of Gipps Land, Colony of Victoria, was first registered in 1863. In 1867, the present general manager, Mr. Ramsey Thompson, was appointed the engineer and superintendent of the enterprise. Underground workings by tunnel, with shafts therefrom and various levels at different depths, are very extensive, while a costly plant, of the most improved character, has been provided, including pumping machinery. The first dividend was paid in 1865 of \$5 per share on 2,400 shares. Ever since December 1869 or for seventeen years, this quartz has averaged 1 oz. 11 dwts. 17.24 grs. per ton, and at this time there is enough of similar quartz exposed to keep a 40-stamp mill running for five years. In these seventeen years the amount of quartz milled has aggregated 289,639 tons 10 cwt. with a yield of 459,767 ozs. 8 dwts of gold of the gross value of \$8,102,000. Out of this the shareholders have received \$4,884,000 or \$2,000 per share. Two items of heavy expense are fuel and mine timber which have to be brought some distance and have involved the construction of fourteen miles of tramway amid precipitous mountains with steel, iron and wood rails.

A 9,000-pound mass of tin ore was recently exhibited at a smelting works in New York. It was taken out of a 29-foot vein in the well-known Etta tin mine in the Black Hills.

DISCOVERY OF GOLD IN PATAGONIA.—A gold fever is raging in the Argentine Republic in consequence of the reports of the discoveries of the precious metal in Patagonia.



All correspondence under this head, and scientific exchanges, must be addressed to the Science Editor, Canadian Mining Review.

THE ROYAL SOCIETY OF CANADA held its annual meeting on the 25th ult. and two following days. The meeting was the most important and interesting yet held by that Association, with regard to both the number and the kind of the papers presented to the various sections. There can be no greater evidence of the usefulness of the Society than the vast amount of work accomplished during the past year under its auspices. Single stars which before shone in solitary splendor in the scientific or literary firmament of Canada now emit a dazzling light when clustered in a constellation; and individual abilities which were not wanting in our young country, now roused to emulation, and encouraged by the facilities afforded for an exchange of ideas, produce a hundredfold to the great benefit of art, science and industry.

THE SCIENTIFIC SECTIONS deserve much more than a passing notice. We intend giving a review of the different papers, which cover a wide field of knowledge. Botany and geology, especially geology, gave valuable contributions. Chemistry and physics, though they received less attention, were not neglected, and it was a rare treat for the student of mathematics to witness the ease with which important questions in the higher branches of that science were treated. Canada, and our province in particular, may feel proud of its professors, and it has been said with truth that Ontario is equal to any other province or state in the attention devoted to mathematics in its colleges and schools.

IT IS SURPRISING, however, to see how little interest is manifested in the work of the Royal Society. Though the press of the city has displayed a most commendable zeal in calling public attention to the important business transacted at the meetings, the members of the Society were practically alone to profit by the information given in the various papers. Many reasons might be given to explain, though not to excuse that indifference of the intelligent public of Ottawa. One will be sufficient. The meetings are held in the Parliament buildings at a time when, the House being in session, a vast amount of noise and bustle must necessarily drown the tranquil echo of scientific discussion. Besides, the rooms in which the meetings are held are not those to which the public usually have access, and the sections are so frequently forced to flit from one room to another as to discourage any but the true lover of science and literature. It is, therefore, much to be hoped that the Society may find in some of our large Institutions suitable halls easy of access to the public, and where better accommodation can be had for the discussion of scientific and literary topics.

A MOST HAPPY CHOICE has been made in the person of the very Rev. T. E. Hamel, the new President of the Royal Society of Canada. This gentleman, one of the most distinguished members of the Roman Catholic clergy of Canada, has been for many years Rector of Laval University. He is not only remarkable for his lofty scientific attainments, but is also one of those liberal-minded men whose unselfishness, affability and modest ignorance of personal merit will have the natural effect of removing pre-

judices, and bringing the various sections of the community to work harmoniously together for the common good.

ARTESIAN WELLS.—The fifth annual report of the U.S. Geological Survey contains a lengthy paper on the geological and other conditions necessary to success in boring artesian wells. Some facts not very generally known are mentioned in connection with the subject. Crystalline rocks, although frequently containing fissures and channels near the surface, are not to be depended upon as water bearing beds; for these crevices generally disappear at greater depths, and the strata become impervious. Water sometimes makes its way through the fissures of limestone; but, as in granite, these fissures become smaller in proportion to the depth of the rock, until at length they are entirely closed. However, quite a number of important artesian wells spring from a limestone bed. The most porous, and therefore the best water-bearing beds are formed by the sandstones. The best confining beds is a thick layer of fine, unhardened clay. The lower confining bed does not require to be as completely impervious as the upper one, for the leakage will be caught by other layers farther beneath. But the upper confining stratum must be absolutely impermeable, or the great upward pressure will cause the water to escape. Water itself is capable of acting as a confining bed in many cases. If some of the common underground water, in which ordinary wells have their source, lies between the artesian well and its source, at an elevation equal to that of the fountain which feeds the water bed, no leakage can be caused by the upward pressure, even though the upper confining stratum be permeable. If the underground water is higher than this fountainhead, it will penetrate the water-bearing bed, and cause a stronger flow through the artesian well. But if the underground water be situated lower than the fountain, leakage will occur if the upper confining bed be not impermeable. From the use here made of the term fountain, many have been led into the mistake of thinking that the water-beds, from which spring artesian wells, are fed by surface lakes or subterranean reservoirs. The former theory is untenable since the bottoms of surface lakes are impermeable. If this were not the case how could lakes retain their water? Neither are underground pools the feeders of water-beds. When we speak of the fountain head of a water-bed, we mean simply the water absorbed by the highest portion of the bed at or near the surface which is constantly flowing downwards and as constantly receiving a fresh supply from above.—D. V. P.

CAVERNS.—It is already eight years since the famous underground caves at Luray, in central Virginia, were discovered, and yet information regarding them is not very widely spread. They are hollowed out of Lower Silurian limestone of the Tertiary period, or perhaps an earlier date. At first there was probably but a small fissure in the rock, through which flowed water containing carbonic acid in solution. This stream gradually wore away the limestone in various directions being aided in the erosion perhaps, by sand which it carried in its waters. Naturally, as the supports were hewn away from the bottom, large masses would fall from the top, giving the incipient cavern a lofty altitude. After the water had done its work, it seems to have been turned into another channel by some geological change. Now the period of ornamentation began. The surface water percolating through the limestone, and becoming charged with carbonate of lime

dropped to the floor or evaporated on the roof, forming beautiful stalagmites and stalactites, which being constantly increased by new formations sometimes extended to meet one another, and form whole sheets of carbonate, resembling the most delicate drapery. After this it appears that the cavern became again a drainage channel, this time for the corrosive mud of the glacial period. This mud stained the sides of the cave and its newly formed stalagmitic columns. Its corrosive action is visible in the various forms into which it carved and twisted these columns. At the end of the glacial period the channel was once more free, and new calcite pillars and draperies were formed. When the cavern was discovered in 1878, the skeleton of a human being was found in a secluded part of it. But the hopes of our progressive (?) geologists were not yet to be fulfilled by the discovery of a secondary or tertiary man, for the tufa in which the remains were found was evidently of recent origin. The largest of the halls in the cave of Luray is called the Cathedral. It contains a massive block of stone, resembling in shape an organ. Attached to this are eleven parallel blades of stalactite, each of which when struck gives a different note, so that tunes can be played on them. The Cascade, the Angel's Wing, and the hollow column, the interior of which may be ascended to a height of sixty feet, are among the objects of interest to visitors. The fauna of the Luray caves is not very numerous, the principal specimens being some spiders and a myriapod. The writer in the *S. M. Quarterly*, to whom we are indebted for all the above mentioned facts in this connection, says that no other cavern in the world is so completely decorated with stalagmitic formations.—D. V. P.

SCIENTIFIC NOTES.

WATER.—The best means of purifying water suspected of containing those micro-organisms, which produce so many epidemic diseases, is to filter it through vegetable carbon of lime.

GEMS.—In view of the approaching sale of the crown jewels, by the republic of France, it is interesting to note that two of these are of American origin, a very beautiful amethyst and a sapphire, both of which were found in New Carolina.

THE DAWSON PRIZE, offered by Dr. G. M. Dawson, F.R.S.C., acting Director of the Geological Survey, to the Mineralogical Society of the College of Ottawa, for the best essay presented to the society by a student of the Institution, has been awarded to Mr. Walter A. Herckenrath, of Mamaroneck, N.Y. The successful essay was a thesis to establish the "Absence of man during the Tertiary age."

OZONE.—Sick rooms and hospitals, theatres and other places of public resort, can now be easily ventilated by the ozone machine, which is operated by electricity. The purifying qualities of this gas are thus practically applied where they are much needed. Large bleacheries are also beginning to make use of the well known but hitherto unused bleaching qualities of ozone.

SULPHUR.—Prof. Bloxam, the distinguished chemist, has called attention to a fact not generally mentioned in text-books, viz., the crystallization of sulphur from a solution in hot alcohol. This is important, when we consider that in practical organic chemistry alcohol is frequently passed through rubber corks. If a

rubber cork be boiled for fifteen minutes with alcohol, the solution, when cooled, will deposit white, transparent, prismatic crystals of sulphur.

GAS.—Dr. Auer, of Paris, has made an addition to the Bunsen's burner, so familiar to every laboratory student, in the shape of a small conical cylinder, made of cotton or woollen fabric, previously saturated with nitrate or acetate of lanthanum and zirconium, or yttrium and zirconium. When the gas flame passes into this cylinder it develops considerable heat, and soon becomes incandescent, giving forth a steady and brilliant white light. This new invention is likely to revolutionize the gas industry.

TARIFF.—All who are interested in the progress of practical science in our Canadian schools and colleges must commend the wisdom of the Dominion Government, in replacing scientific apparatus on the list of articles admitted free of duty. This change, it is believed, is largely due to the representations made by the various educational institutions, who proved that it would be a great hindrance to the prosecution of scientific studies, if they were obliged to pay a high duty on instruments, many of which can be manufactured only in one or two cities of Europe.

CYANOGEN.—Prof. Dixon, M.A., in a paper read before the Chemical Society of London, compares the results of experiments in the combustion by electricity of cyanogen and oxygen with those obtained from the combustion of carbonic oxide and oxygen. As the presence of aqueous vapour in the latter case increases the force of the explosion, he was led to think that his failure in previous experiments with the former was owing to the absence of moisture. He afterwards discovered that it was the insufficient temperature of the electric spark passed through the cyanogen and oxygen, that prevented the combustion, and that moisture, instead of increasing the explosive force in this case, diminished it. The reaction of carbonic oxide with oxygen, when a platinum wire is heated to redness in a mixture of the gases, is entirely similar to that produced by cyanogen with oxygen under the same circumstances. In one the cyanogen, and in the other the carbonic oxide combines with the oxygen without visible flame. In the case of cyanogen, however, the characteristic orange vapour is generated in the tube.

METEORITE.—Mr. Orville A. Derby, who was recently charged with the duty of examining the famous Santa Catharina meteorite, preserved in the Brazilian National Museum at Rio Janeiro, has given to the world through one of the scientific periodicals, some account of his labours, in advance of the memoir about to be published. On the surface of this meteorite, when discovered, there was a strong crust, which M. Daubree, a French mineralogist, who studied the meteorite, thought to be of terrestrial origin. He called it limonite, and supposed that it had been produced by the oxidation of the iron after its fall, and the adhesion of fragments of the granite among which it was found. Mr. Derby claims that this crust, instead of being earthy is an essential part of the meteorite, and a confirmatory evidence of its origin. The crust consists of two parts, the one granitoid, the other porphyritic. The former is composed essentially of olivine, in glassy, crystalline fragments, and of small grains of plagioclase feldspar, with veinlets of black limonite running through the whole. Under a microscope the granitoid resembles porphyry. No grains of metallic iron have been detected in this part of the crust, but its slightly magnetic

quality causes suspicion of their presence. The porphyritic portion of the crust resembles the masses of limonite found in decomposed granite. It consists of grains of olivine mingled with rare fragments of plagioclase. It differs from the granitic form by the feldspar's being clearer and more transparent. Whatever opacity does exist is owing to the vitrification of the margins of the grain, and not to decomposition. To ascertain whether, as he thought, the porphyritic rock was produced by the partial fusion of the granitoid, Mr. Derby performed a synthetic experiment. Taking quartz to represent the infusible, and labradorite the fusible material, he fused together unpowdered fragments of these minerals with iron filings, and some magnetic pyrites. The product of the incomplete fusion resembled very much the meteoric crust, the principal differences being that the glass was clearer, and the grains of feldspar not vitrified, more opaque. It is proved, therefore, that the Santa Catharina meteorite is a mixture of metallic and silicious elements, the stony part being a new type consisting of olivine and plagioclase. The partial vitrification of the stony portion is a sure proof of the meteoric origin. The presence of silicates forming a crust of low conducting power around the iron, accounts for its low magnetism. It was this that led Becquerel to think that the iron had crystallized at red heat, a fact at variance with the well known properties of meteorites.

BOOK NOTICES.

ELEMENT OF THE THEORY OF THE NEWTONIAN POTENTIAL FUNCTION, by B. O. Peirce, Ph. D., Assistant Prof. of Mathematics and Physics, in Harvard University; 154 pages, large 12mo. Boston—Ginn & Co.

The preface states that the book is intended for "Readers somewhat familiar with the principles of the differential and integral calculus, but unacquainted with many of the methods commonly used in applying mathematics to the study of physical problems." In this respect the book supplies a long-felt want, and gives to those wishing to make a thorough study of physics, especially of those branches in which higher mathematics are used, the most necessary and practical applications of mathematics to physics. In this book of 154 pages are gathered together methods that the student would have to seek out by tiresome search in many different volumes. Numerous exercises are given which will enable the student to retain firmly the methods studied. The book is printed with the taste and neatness characteristic of the textbooks of Ginn & Co.

ELEMENTARY CO-ORDINATE GEOMETRY, FOR COLLEGIATE USE AND PRIVATE STUDY, by William Benjamin Smith, Ph. D., Professor of Physics, Missouri State University. 8vo., 280 p. Boston—Ginn & Co., 1886.

The student, who, attracted by the title of this book, would attempt to master it, with the ordinary amount of knowledge derived from an elementary course of algebra, geometry and trigonometry, would surely be disappointed. The motto, "maximum reasoning, minimum reckoning," chosen for this work, is not the passport of the average student of schools and colleges. But to him who is already familiar with mathematical reasoning, for whom ordinary algebra at least has no mysteries, and who is

able to devote a few hours each week with or without the assistance of a teacher, to the study of analytical geometry, the present work will prove a most efficient guide. Mathematical precision, enhanced by the use of abbreviations, and perhaps even a little exaggerated by the introduction of new terms destined to replace long expressions is the characteristic feature of the work. Another feature is the beautiful selection and gradation of exercises which will prove a real treasure to the private student as well as to the teacher. Despite its title the work treats of many questions which are absent from the text-books now in use; and every question treated, thanks to the vigorous style of reasoning, and the elimination of details, receives a most complete elucidation. We commend this work to all those who understand the necessity of mathematical reasoning for the training of the mind.



NOVA SCOTIA.

Twelve tons of quartz from the Kemptville Mine were put through the mill the last week in May and yielded 21 ounces of gold.

It is stated that a company has been formed to test a lead of gold-bearing quartz which has been discovered in the vicinity of Bear River, Digby County.

A seam of coal which has been recently discovered near the head of the West River is said to be larger than any of the numerous seams known to exist in the Pictou coal fields.

A New Brunswick company has purchased a manganese mine on the East Mountain, Colchester County. Some development work was done last summer on this property which is situated within a few miles of the Pictou branch of the Intercolonial Railway.

The Salmon River gold mine gives constant employment to forty men and the monthly expenditure by the company is \$2,000. Eight batteries, with five stamps each, are now in operation, and the head of water at the mine is sufficient to run a mill of double that capacity. Two pumps, also worked by water power, are in operation night and day and keep the mine quite dry.

The air is thick with rumors of important sales of gold mining property and an immediate and extensive resumption of operations on "The Nova Scotia Central Railway." A glimpse of a \$50,000 bond and the fact that Herr Fink has proceeded to the United States to purchase a crusher, go to fix some of the reports in the land of facts and indicate a busy season.—*Bridgewater Times*.

Letters Patent of Incorporation have been granted to Joseph Robbins Kinney, J. R. Wyman, R. S. Eakins, A. W. Eakins and G. W. Johnson, all of Yarmouth, under the name of the "Kempt Gold Mining Company (Limited)." The capital stock is \$30,000, divided into 100,000 shares of 30 cents each, and the company's chief place of business, Yarmouth. The company is now working the *Reeves Mine*

and has already crushed 80 tons of quartz which yielded 114 ounces of gold.

QUEBEC.

We have received a handsome specimen of green phosphate taken from a large body of ore at the bottom of the main shaft of the *North Star* mine in Portland East. The shaft is down 300 feet and is the deepest in the phosphate district. The ore at this depth is of very high grade and peculiarly free from impurities.

Professor Chapman, of Toronto, has recently inspected the St. Onge gold mine in Beauce and has been very favourably impressed. Of it he says: "The permanent presence of gold in the mine is fully established, and every cleaning up shows no inconsiderable amount of it." Professor Chapman is of the opinion that the drifts are at present in what must necessarily be the poorest part of the mine, and that consequently, when less broken ground is reached, a large increase in gold may be legitimately expected.

The tramway, recently constructed at the *High Rock* phosphate mine in Portland West, has been in running order for some time, and is proving a valuable addition to the company's improvements. Eighty tons of phosphate are now shipped daily over the tramway from the mine to the river bank. The largest boiler in the phosphate district is now being delivered at *High Rock*. It has a capacity of eighty-five horsepower, and measures 13 ft. 6 in. long by 5 ft. 6 in. in diameter. It was made by W. J. Campbell & Co., of Ottawa, and will be used to run an air compressor and eight drills.

ONTARIO.

The town of Wingham now boasts of having the best salt well in the province. It was struck at a depth of 1,100 feet. The Canadian Pacific Railway Company have agreed to extend its line to Wingham on the condition that salt-works will be established in connection with the wells.

Work was resumed last winter in the old shaft at the Michipicoten Native Copper Company's mine. It is now down 450 feet, and a cross-cut is shortly to be started. A recent discovery of native copper, associated with native silver in a two feet vein, has excited new interest in the property.

The Perth district is again coming to the front as a phosphate mining section. The operations of the Anglo Canadian Phosphate Company and Messrs. Wilson & Green, of Montreal, have stimulated the industry in this locality, and prospectors are again busily at work. Some recent developments are of a very important character.

A valuable gold mining location has been taken up at Lake Osinawe, to the north of Thunder Bay. The formation is granite with a belt of talcose slate running through it in an easterly direction. This talcose slate belt is 20 to 60 feet wide, interlaminated with auriferous quartz. One of the quartz leads is 16 feet wide and increases in width as it juts into the lake. A quantity of the quartz, representing a fair average from this lead, has been assayed and found to contain 2.042 ounces of gold per ton. Other smaller leads on the location are rich in free gold.

BRITISH COLUMBIA.

Some of the claims on Granite creek yielded \$200 per day before work had to be suspended on account of the freshet.

Another gold-bearing creek has been discovered ten miles from Allison's emptying into the Semilkameen, and is reported by prospectors as showing good colours.

The Kootenay Mining and Smelting company have purchased a seven-eighths interest in Rainee's and Williams' claim on Lake Pend d'Oreille, and will put up a smelter immediately.

Quite a large number of Chinamen have proceeded to the Nanaimo Lakes *via* Harewood. The Mongolians have struck some bench diggings in the vicinity of the headwaters of the Nanaimo river.

Collin's creek, between Granite city and Otter Flat, shows good prospects and some coarse gold has been secured which is brighter in appearance than that on Granite creek. Those who have claims on the creek are more than pleased with the prospects.

Reports from Alberni state that fifteen Chinamen have been mining on China creek since last fall. Their force has been increasing every week and will soon number 100 miners, which is strong evidence that gold is being found on the creek in paying quantity.

Great confidence is expressed by some in the result of this season's work in the gold diggings at Granite Creek. At present the camp consists of about 800 whites and 600 Chinamen, and it is said that nearly all who intend leaving before the end of the season have already gone.

Advices from Granite city report a few companies at work on the south fork, about three and a-half miles above the city, where, it is expected, paying claims will be found. Portions of the creek at this point have been wing-dammed for the purpose of testing the gravel on bed-rock.

The freshet in the Semilkameen district has been very strong this season and will not allow full scope for work until the beginning of July. More miners are leaving the district than going to it, which is more from a knowledge that the season will be late than from being aware as to how the field will "pan out."

The New Brunswick Mining Company, one of the wealthiest organizations on the Tulameen, has begun operations on a 2,000 ft. claim. Large results are anticipated as the ground has prospected well. The Californian Company, also owner of a large extent of ground on the Tulameen, has resumed operations.

The ledge of the "Queen" quartz mine at Yale has increased in width from 5 feet to 8 feet and gives indications of being a true fissure vein. The gangue is composed of decomposed quartz and porphyry with galena, iron pyrites, magnesia and blende well disseminated through it. If the "Queen" develops well, and there is every prospect of its doing so, Yale will become an active mining centre.

The mining interests on Lake Kootenay are promising. Four or five galena mines have been worked all winter and a large quantity of

ore taken out awaits transportation. The construction of the Kootenay railway is looked forward to and as soon as it becomes a certainty mining in the district will be vigorously pushed. At the town of Radnaid several houses have sprung up in anticipation of the opening of the Goat river quartz mines.

It is thought that Otter Flat will become the chief mining camp of the Tulameen district. It is one and a half miles from Cedar creek, two from Collin's creek, three from Slate creek, eight from Bear creek, and fourteen miles from Champion creek. These are all gold-bearing creeks and tributaries of the Tulameen river. Otter Flat is six miles from Granite city and is at the junction of Otter creek with the Tulameen river.

A large number of miners have been attracted during the spring to the gold diggings on the Stewart river, a branch of the Zukon, and upwards of fifty started in April from Juneau. The route taken was from Juneau to Chileat, 75 miles, thence across the mountains, 35 miles, to a chain of lakes emptying into the Felly river. From this point they proceeded in boats to the Zukon river, a distance of 350 miles, and thence down that river to the Stewart river, the scene of the gold excitement.

UNITED STATES.

The Montana Copper Company, of Butte, Montana, a large producer last year, is now raising comparatively little ore.

The Lake Superior copper product for the first quarter of this year exceeds that reported for the same quarter of 1885 by 2,113 tons, of which the Calumet and Hecla furnished about 1,000 tons.

The Plymouth Consolidated Gold Mining Company produced \$155,192.39 in gold during January, February and March of this year, and paid three monthly dividends, aggregating \$75,000. The ore from the mine, situated in Amador county, California, yields an average of \$11 per ton, chiefly in the form of free gold. All the ore goes directly to the stamp-mills, of which there are two. The older and larger mill contains sixteen batteries of five stamps each, with one Frue Vanner to each battery. The new mill has eight batteries of five stamps and two Frues to each battery. The large mill is driven by Leffel turbine-wheels, with a pressure of eighty feet, and a consumption of 600 miners' inches of water. The smaller mill is driven by "hurdy-gurdy" wheels, with a pressure of about 550 feet and a consumption of 150 inches of water.

South American Mining Notes.

The *Amigo del Paris* says that gold mining has received so great an impulse in Atacama that there is no doubt this branch of mining will become the industry of the province. Large capital is required for the prosecution of this enterprise, and our miners are beginning to comprehend the truth. With capital, continues the paper in question, Atacama may become a second California for abundance of gold.

The *Constituyente* furnishes the following interesting statistics respecting the production of silver and gold in the Copiapo mineral districts in January: There were sent down to Caldera for shipment from Copiapo 2,032,991 grams of

silver, and from Pabellon 568,064 grams. The receipts in Copiapo of bar silver were 3,730 grams from San Antonio; 935,940 do. from Juan Godi; and 585,710 do. from Puquois. The receipts of gold were 14,242 grams in Caldera, and 2,410 grams in Copiapo. The totals are 7,126,434 grams of silver and 16,952 grams of gold.

The Veterana mine of the Quintana district is paying another dividend of \$400 per share. The steamer which sailed from Coquimbo on the 4th instant, shipped for Valparaiso 168 kilograms, 16 grams of bar silver, the production of this famous mine.

The net receipts of the Huanchaca mines in February amounted to one million dollars, Bolivian currency. Typhus and yellow fever are reported to be prevalent in the Huanchaca district.—*F. & M. Record.*

First Silver in Colorado.

The first discovery of silver in Colorado was accidentally made in Summit county, something in this way:

Some gulch miners from Blue river, hunting for deer in 1861, ran out of bullets, and happening upon what they took to be a lead vein, manufactured some from the outcroppings. A year or two later, happening to be in Nevada, they were strongly impressed with the resemblance between the silver-bearing galena ores of that State and the material in the mountains of Colorado, from which they had once manufactured bullets. They wrote to an old friend at Empire, advising him to go over and locate the once despised lead vein. He finally did so and named the vein *Coaley*. He, however, never made a fortune from his venture, his mine being too far away from the ore markets, and also over the range from them. But the incident led to the recognition of the silver ores of Clear Creek county and resulted ultimately in the developments that have built up so many towns and cities, and added so much to the wealth of Colorado.—*Leadville Herald-Democrat.*

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MINING REGULATIONS

To Govern the Disposal of

Mineral Lands other than Coal Lands.

1886.

THESE REGULATIONS shall be applicable to all Dominion Lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, iron, or other mineral deposits of economic value, with the exception of coal.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein, either by surface or subterranean prospecting, for mineral deposits, with a view to obtaining under the Regulations a mining location for the same, but no mining location or mining claim shall be granted until the discovery of the vein, lode, or deposit of mineral or metal within the limits of the location or claim.

QUARTZ MINING.

A location for mining, except for iron, on veins, lodes, or ledges of quartz or other rock in place, shall not exceed twenty acres in area. Its length shall not be more than three times its breadth, and its surface boundary shall be four straight lines, the opposite sides of which shall be parallel, except where prior locations would prevent, in which case it may be of such a shape as may be approved of by the Superintendent of Mines.

Any person having discovered a mineral deposit may obtain a mining location therefor, in the manner set forth in the Regulations which provide for the character of the survey and the marks necessary to designate the location on the ground.

When the location has been marked conformably to the requirements of the Regulations, the claimant shall, within sixty days thereafter, file with the local agent in the Dominion Lands Office for the district in which the location is situated, a declaration or oath setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as aforesaid; and shall, along with such declaration, pay to the said agent an entry fee of FIVE DOLLARS. The agent's receipt for such fee will be the claimant's authority to enter into possession of the location applied for.

At any time before the expiration of FIVE years from the date of his obtaining the agent's receipt, it shall be open to the claimant to purchase the location on filing with the local agent proof that he has expended not less than FIVE HUNDRED DOLLARS in actual mining operation on the same; but the claimant is required before the expiration of each of the five years, to prove that he has performed not less than ONE HUNDRED DOLLARS' worth of labour during the year in the actual development of his claim, and at the same time obtain a renewal of his location receipt, for which he is required to pay a fee of FIVE DOLLARS.

The price to be paid for a mining location shall be at the rate of FIVE DOLLARS PER ACRE, cash, and the sum of FIFTY DOLLARS extra for the survey of same.

Not more than one mining location shall be granted to any individual claimant upon the same lode or vein.

IRON—The Minister of the Interior may grant a location for the mining of iron, not exceeding 160 acres in area, which shall be bounded by north and south and east and west lines astronomically, and its breadth shall equal its length. Provided, that should any person making an application purporting to be for the purpose of mining iron thus obtain, whether in good faith or fraudulently, possession of a valuable mineral deposit other than iron, his right in such deposit shall be restricted to the area prescribed by the Regulations for other minerals, and the rest of the location shall revert to the Crown for such disposition as the Minister may direct.

The Regulations also provide for the manner in which land may be acquired for milling purposes, reduction works, or other works incidental to mining operations.

Locations taken up prior to this date may, until the 1st August, 1886, be re-marked and re-entered in conformity with the Regulations without payment of new fees, in cases where no existing interests would thereby be prejudicially affected.

PLACER MINING.

The Regulations laid down in respect of quartz mining shall be applicable to placer mining as far as they relate to entries, entry fees, assignments, marking of localities, agents' receipts, and generally where they can be applied.

The nature and size of placer mining claims are provided for in the Regulations, including bar, dry, bench, creek or hill diggings, and the RIGHTS AND DUTIES OF MINERS are fully set forth.

The Regulations apply also to

BED-ROCK FLUMES, DRAINAGE OF MINES, AND DITCHES.

The GENERAL PROVISIONS of the Regulations include the interpretation of expressions used therein; how disputes shall be heard and adjudicated upon; under what circumstances miners shall be entitled to absent themselves from their locations or diggings, &c., &c.

THE SCHEDULE OF MINING REGULATIONS

Contain the forms to be observed in the drawing up of all documents, such as:—"Application and affidavit of discoverer of quartz mine." "Receipt for fee paid by applicant for mining location." "Receipt for fee on extension of time for purchase of a mining location." "Patent of a mining location." "Certificate of the assignment of a mining location." "Application for grant for placer mining and affidavit of applicant." "Grant for placer mining." "Certificate of the assignment of a placer mining claim." "Grant to a bed-rock flume Company." "Grant for drainage." "Grant of right to divert water and construct ditches."

Since the publication, in 1884, of the Mining Regulation to govern the disposal of Dominion Mineral Lands, the same have been carefully and thoroughly revised with a view to ensure ample protection to the public interests and at the same time to encourage the prospector and miner in order that the mineral resources may be made valuable by development.

COPIES OF THE REGULATIONS MAY BE OBTAINED UPON APPLICATION TO THE DEPARTMENT OF THE INTERIOR.

A. M. BURGESS,

Deputy Minister of the Interior.



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DEPARTMENT OF INLAND REVENUE.

AN ACT RESPECTING AGRICULTURAL FERTILIZERS.

THE public is hereby notified that the provisions of the Act respecting AGRICULTURAL FERTILIZERS came into force on the 1st of JANUARY, 1886, and that all Fertilizers sold thereafter require to be sold subject to the conditions and restrictions therein contained—the main features of which are as follows:—

The expression "fertilizer" means and includes all fertilizers which are sold at more than TEN DOLLARS per ton, and which contain ammonia or its equivalent of nitrogen, or phosphoric acid.

Every manufacturer or importer of fertilizers for sale, shall, in the course of the month of January in each year and before offering the said fertilizer for sale, transmit to the Minister of Inland Revenue, carriage paid, a sealed glass jar, containing at least two pounds of the fertilizer manufactured or imported by him, with the certificate of analysis of the same, together with an affidavit setting forth that such jar contains a fair average sample of the fertilizer manufactured or imported by him; and such sample shall be preserved by the Minister of Inland Revenue for the purpose of comparison with any sample of fertilizer which is obtained in the course of the twelve months then next ensuing from such manufacturer or importer, and which is transmitted to the chief analyst for analysis.

If the fertilizer is put up in packages, every such package intended for sale or distribution within Canada shall have the manufacturer's certificate of analysis placed upon or securely attached to each package by the manufacturer; if the fertilizer is in bags, it shall be distinctly stamped or printed upon each bag; if it is in barrels, it shall be either braided, stamped or printed upon the head of each barrel, or distinctly printed upon good paper and securely pasted upon the head of each barrel, or upon a tag securely attached to the head of each barrel; if it is in bulk, the manufacturer's certificate shall be produced and a copy given to each purchaser.

No fertilizer shall be sold or offered or exposed for sale unless a certificate of analysis and a sample of the same shall have been transmitted to the Minister of Inland Revenue, and the provisions of the foregoing sub-section have been complied with.

Every person who sells, or offers or exposes for sale, any fertilizer, in respect of which the provisions of this Act have not been complied with,—or who permits a certificate of analysis to be attached to any package, bag or barrel of such fertilizer, or to be produced to the inspector, to accompany the bill of inspection of such inspector, stating that the fertilizer contains a larger percentage of the constituents mentioned in sub-section No. 11 of the Act than is contained therein,—or who sells, offers or exposes for sale any fertilizer purporting to have been inspected and which does not contain the percentage of constituents mentioned in the next preceding section,—or who sells or offers or exposes for sale any fertilizer which does not contain the percentage of constituents mentioned in the manufacturer's certificate accompanying the same, shall be liable in each case to a penalty not exceeding fifty dollars for the first offence, and for each subsequent offence to a penalty not exceeding one hundred dollars: Provided always, that deficiency of one per centum of the ammonia or its equivalent of nitrogen, or of the phosphoric acid, claimed to be contained, shall not be considered as evidence of fraudulent intent.

The Act passed in the forty-seventh year of Her Majesty's reign, chaptered thirty-seven and intitled "an Act to prevent fraud in the manufacture and sale of agricultural fertilizers", is by this Act repealed, except in regard to any offence committed against it or any prosecution or other act commenced and not concluded or completed, and any payment of money due in respect of any provision thereof.

A copy of the Act may be obtained upon application to the Department of Inland Revenue.

E. MIALL,

Commissioner.



AUCTION.

Phosphate Lands.

NOTICE IS HEREBY GIVEN THAT about 14,500 acres of Public Lands, situated in the Phosphate region, in the County of Ottawa, Province of Quebec, will be offered for sale by Public Auction, at the

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—ON—

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the month of June, '86

Lists containing numbers of lots to be sold, may be had on application to the Department of Crown Lands, Quebec, or to the Crown Land Agents at Hull and Thurso, P.Q., or Crown Timber Agents, Montreal and Ottawa.

W. W. LYNCH,

Commissioner.

Department of Crown Lands,
Quebec, 20th May, 1886.

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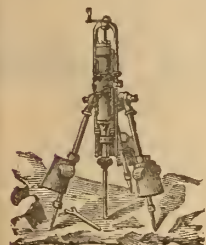
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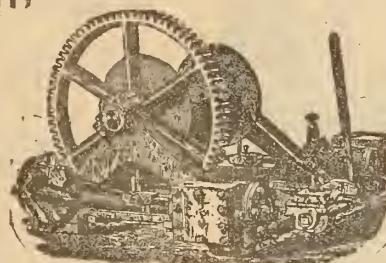
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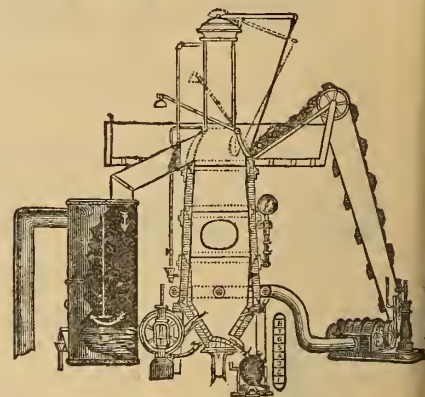
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**ORDNANCE LAND SALE.**

TORONTO.

PUBLIC NOTICE is hereby given that on **THURSDAY**, the 16th day of **SEPTEMBER**, inst., at noon, will be sold at Toronto, by Mr. John M. McFarlane, Auctioneer, at his Auction Rooms, No. 8 Adelaide Street, East, the following Lots, the former sales of which have been cancelled, viz.,

Lots No. 2 and 4, South King Street, one North Wellington Avenue, and a triangular piece of land on the South-West corner of Strachan and Wellington Avenues.

TERMS OF PAYMENT.—One-fifth of the purchase money to be paid down at the time of sale, and the remainder in four equal annual instalments, with interest on the unpaid balance of the purchase money at the rate of six per cent.

Further conditions will be made known at the time of sale.

By order

A. M. BURGESS,

Deputy of the Minister of the Interior.

WILLIAM MILLS,

In charge of Ordnance and Admiralty Land
Ottawa, September 8th, 1886.

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ASBESTOS, COAL, PLASTER, IRON ORES, MANGANESE, OCHRE, COPPER, TIN and LEAD ORES. Also for making RAILROAD BALLAST and CONCRETE.

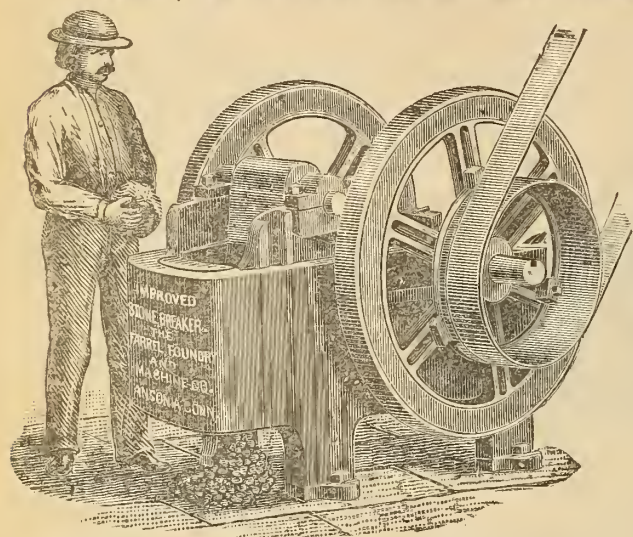
MR. S. L. MARSDEN, who for the past twenty years has been connected with the manufacture of the “Blakes Crusher,” New Haven, superintends the construction of this machine. Awarded GOLD MEDAL at the Massachusetts Mechanics' Association, 1881, and SILVER MEDAL (special) American Institute, 1882.

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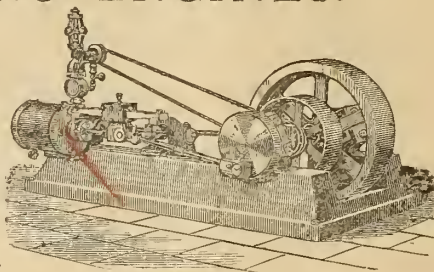
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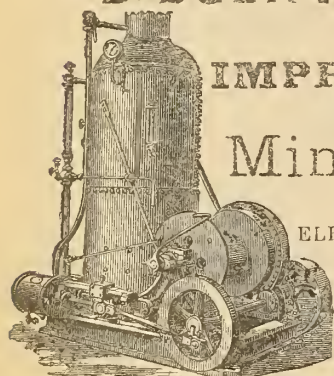
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**TIMBER SALE.**

THE timber on certain lots in the townships of Eastnor, Lindsay, St. Edmund, Altonville and Amabel, in the County of Bruce, and Keppel, in the County of Grey, in the Province of Ontario, will be offered for sale at Public Auction in blocks of 200 acres, more or less, on the 12th Day of OCTOBER next, at ten o'clock a.m., at the Indian Land Office, in the village of Wiarton.

Terms of sale to be—A bonus payable in cash, a license fee also payable in cash, and dues to be paid according to tariff upon the timber when cut.

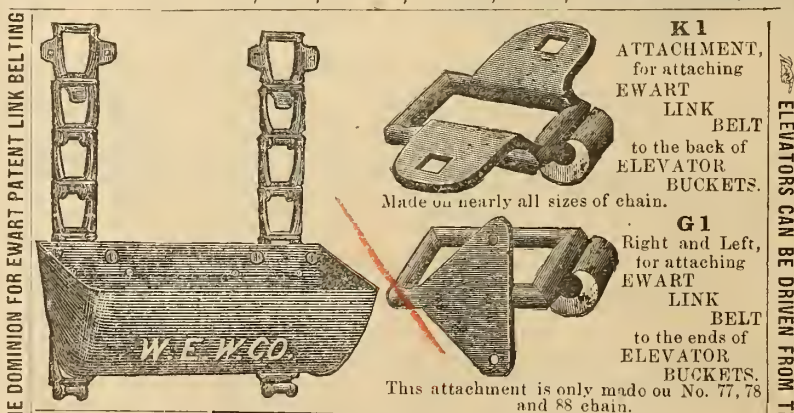
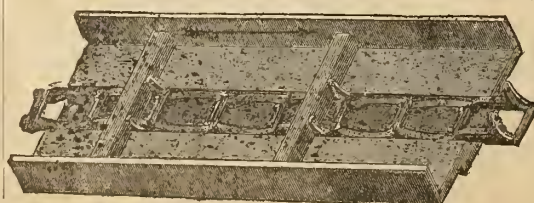
The purchasers of timber to have the option of purchasing, without any condition as to settlement, the land on which it grows, at a price to be determined by the department, and to be made known at the time of sale, and to be paid one-third down and the balance in two equal consecutive annual instalments, with interest at 6 per cent.

For full particulars please apply to Wm. Simpson, Esq., Indian Land Agent, Wiarton, or to the Department of Indian Affairs, Ottawa.

No other paper to insert this advertisement without authority through the Queen's printer.

L. VANKOUGHNET,
Deputy of the Supt.-General of Indian Affairs.

Department of Indian Affairs,
Ottawa, 20th Aug., 1886.

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OTTAWA.

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OFFICE:

UNION CHAMBERS, 14 Metcalfe Street.

The CANADIAN MINING REVIEW is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts as well as others interested in Canadian Mineral Lands are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 20th of the month.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

It has already become a well recognized fact that the Colonial and Indian Exhibition has been the means of bringing Canada forcibly to the notice of the old world, and her very creditable display of the resources of the Dominion has earned for her a prominent, if not a foremost, place among the British Colonies. Of all her exhibits, however, none appears to have attracted more attention, or created more astonishment, than has the display which represents our vast mineral resources.

Significant evidence that much benefit will accrue to mine owners and owners of mineral lands is in the fact that, since the opening of the Exhibition, we have been recipients of innumerable letters of enquiry from manufacturers and capitalists in all quarters of Great Britain and Europe, asking for information regarding the importance of the mineral deposits of the country and the capabilities of the mines in operation.

In order that such enquiries may be replied to in an intelligent manner, it is absolutely necessary that those people who are most concerned in the development of Canada's mineral resources and the expansion of the markets for the product of her mines, should keep us continually advised on all points of interest in these connections; reporting to us every important discovery, the result of development work, and what has been achieved at working mines.

Visitors to the Colonial and Indian Exhibition who take an interest in mining matters must be struck with surprise and greatly disappointed when they learn that the Dominion of Canada furnishes no official record of mining statistics, and up to date has neglected to publish any authentic information regarding the mineral resources of the country. With this fact before them, how can it be expected that capitalists will be induced to aid us in developing and extending our mining industries, the importance of which the Government has so utterly disregarded.

A desire for speculation and investment in distant and unknown countries has hitherto been a craze among English and European capitalists. Canada possesses some of the best mining fields in the world, and her mineral deposits are sufficiently rich, varied and extensive to invite investigation at least. If the minded men of England who are seeking investments in the mining fields of other countries are skeptical or incredulous as to the richness and vastness of our deposits, we most respectfully request that they examine carefully the display of Canadian minerals at the Colonial and Indian Exhibition and from it draw their own conclusions.

We learn that among other recent visitors to the Mineral Court at the Colonial and Indian Exhibition was Mr. Percy Gilchrist, the well-known English ironmaster and metallurgist, who inspected the exhibits in his capacity as one of the committee appointed by the Iron and Steel Institute to inquire into the iron and steel producing capabilities of the various Colonies represented at the Exhibition. Mr. Gilchrist acquired much valuable information regarding Canadian Iron Ores and was furnished with numerous samples of the ores and pig-irons. These he purposes having analyzed for publication in his committee's report to the Institute.

"A curious bit of experience," says the *American Manufacturer*, "has been had recently at one of the leading steel mills in the United States. A quantity of material for a bridge was rejected by the inspector of the buyers, much to the surprise of the producers. The manufacturers decided to make an independent investigation, which resulted in showing that the rejected material did come up to the specifications. Further research followed, and developed the fact that, for a given number of hours after the material had left the rolls, its physical qualities gradually changed, reaching a period of rest only after a certain time had elapsed. If these facts are borne out by the experience of others a good deal that is mysterious in steel may be explained."

Mr. L. Tietjens, of Stassfurt, Germany, has recently patented a very ingenious method of damming back the flow of water in shafts by the application of the well known fact that certain salts increase their volume very materially by the absorbing of water of crystallization in hardening. To accomplish this, he takes either calcined soda, anhydrous alum, kieserite, or oxychloride of magnesium, mixes them into a paste, and then immediately injects them through a suitably arranged pipe into the fissures through which the water flows. As this paste hardens, it swells enough to fill all the interstices of the rock and to render it thoroughly water-tight.

THE PHOSPHATE TRADE.

Little or no change has been reported in the condition of this industry during the past three months. The foreign market continues inactive and prices rule lower than we have known them within the past four years. Miners, however, have not been discouraged by the fall in values and have not allowed activity at the mines to relax, being confident of a rising market before the close of the shipping season. For this reason also they have been in no hurry to forward their output, as is shown by shipments to date compared with those of last season. While the year's production has not fallen off, the shipments up to and including August have aggregated but 11,256 tons crude, and 1,562 bags ground, as against 14,590 tons crude shipped to same date last year; whereas, the shipments for the month of August just past amounted to 4996 as against 3053 tons for the same month in 1885.

As our quotations show, in the subjoined report, prices have fallen as low as 11 pence for 80 per cent. with one-fifth of a penny rise; but this condition of things is not likely to last, as high grade phosphate is becoming scarce and *Canadian* must, therefore, command a higher price so soon as this fact is realized. There has been a shrinkage in values of all commodities, but apart from the effect of this, and the general agricultural depression, the price of phosphate has been further reduced by competition among the sellers of *Carolina* which is in such large supply that it regulates the market in a great measure. These people have been ruining each other and we have received information that they have become tired of the contest and are planning a combination to raise prices, so that an upward movement for all grades is anticipated for next season.

Indications of a firmer market are apparent already and better prices may be looked for this fall for *Canadian* though the improvement is not likely to occur in any marked degree.

The popularity of Canadian phosphate is now very general with manufacturers, and there is no longer any question as to a large future demand for it in Great Britain and on the Continent. A demand for the ground article is also expanding, and if this is furnished in satisfactory form its use will be speedily extended. The Northern United States must furnish a large market in the near future, and Canada, too, must awake to the necessity of using our mineral phosphate as a fertilizer.

An eminent authority in London, Eng., referring to the Canadian deposits, says:—"There is one thing to be relied on; there will be always a large and increasing demand for mineral phosphates. Nitrogen can be obtained from wood and a multitude of other substances, but the only largely available and cheap source of phosphoric acid is from these minerals."

The facts above enumerated go to show that there will be no falling off in the demand, but that it will increase in proportion to the increased production of our mines, and, referring to the supply of

Canadian phosphate, Dr. Selwyn, during his visit to the Colonial and Indian Exhibition, in his capacity as Director of the Geological Survey, made the following statement:—"I can see no limit to the depth of the phosphate deposits of Canada. Of course there is a limit to the depth at which profitable working can be carried on, but practically there is no limit to the supply; it extends over an enormous area horizontally, as well as to great depth, and it must take centuries to exhaust it."

Practically then, the demand for the product of Canadian phosphate mines is unlimited, and the mines of the Perth and Kingston districts, and of Ottawa county, are inexhaustible. The annual production is rapidly increasing, and phosphate mining gives bright promise of becoming one of the most important industries of the Dominion.

Phosphate Quotations.

Prices for mineral phosphate have not varied much since our last report, except when the price of Canadian dropped to 11d. for 80%, with one-fifth of a penny rise. It has since rallied, and now stands at 11½d for 80%, with a more hopeful outlook for a revival of the market later in the season. No marked improvement is anticipated this year, but a firmer feeling is apparent and better prices are expected all round next year, especially for the higher grades, which are becoming scarce. In the English and Continental markets Canadian phosphate has gained much favor of late, and will always be in demand.

Phosphate Shipments from Montreal to August 26th, 1886.

Date.	Vessel.	Destinat'n.	Shippers or Agents.	Tons
May 12	S.S. Kehrweider	Hamburg.	W. M. Knowles.	1562 bags
" 25	S.S. Oxenholme	Liverpool.	Wilson & Green.	387
" 25	S.S. Oxenholme	"	Lomer, Rohr & Co	3-0
June 4	S.S. Ashton	Sharpness.	Wilson & Green.	299
" 5	Bg. Rhine	London.	Wilson & Green.	229
" 10	Bg. Dictator	"	Wilson & Green.	140
" 11	Bg. Lake Leman	"	Lomer, Rohr & Co	100
" 12	S.S. Berbin	Liverpool.	Lomer, Rohr & Co	100
" 19	S.S. Mat. Beddington	London.	Lomer, Rohr & Co	150
" 26	Bg. Moss Rose	"	Lomer, Rohr & Co	95
" 26	S.S. Carmona	"	Lomer, Rohr & Co	400
" 30	S.S. Benbrack	Liverpool.	Wilson & Green.	416
July 2	S.S. Cairo	London.	Lomer, Rohr & Co	57
" 7	S.S. Oxenholme	Liverpool.	Lomer, Rohr & Co	76½
" 13	Bg. M. E. Seed	"	Wilson & Green.	523
" 13	Bg. M. Mitchell	"	Wilson & Green.	150
" 15	S.S. Benison	"	Lomer, Rohr & Co	260
" 22	S.S. Erl King	London.	Lomer, Rohr & Co	330
" 24	S.S. Dracona	Avonm'th.	Wilson & Green.	492
" 30	S.S. Acton	London.	Lomer, Rohr & Co	535
Aug. 4	S.S. River Indus	Liverpool.	Wilson & Green.	507
" 4	S.S. River Indus	"	W. M. Knowles.	189
" 7	S.S. Juliet	London.	Wilson & Green.	170
" 10	S.S. Kehrweider	Hamburg.	Wilson & Green.	590
" 9	S.S. Benaere	Barrow.	Lomer, Rohr & Co	225
" 11	S.S. Benhope	Liverpool.	W. M. Knowles.	276
" 12	S.S. Carmona	London.	Lomer, Rohr & Co	150
" 14	S.S. Crete	"	Lomer, Rohr & Co	332
" 19	Ship Primus	Liverpool.	Lomer, Rohr & Co	310
" 20	Bg. Ferguson	London.	Lomer, Rohr & Co	252
" 21	S.S. Canonbury	"	Wilson & Green.	220
" 21	S.S. Canonbury	"	Lomer, Rohr & Co	230
" 23	S.S. Oxenholme	Liverpool.	Lomer, Rohr & Co	630
" 26	S.S. Plessey	London.	Lomer, Rohr & Co	440
" 26	S.S. Benbrack	Liverpool.	Lomer, Rohr & Co	435
				11256

Total.....11256 tons crude, 1562 bags ground.

A new gold field in the northern part of Western Australia has been discovered, which is estimated to extend over an area of nearly 4,000 square miles. Already there is a rush of diggers toward the place.

PHOSPHATE MILLING.

Amongst recent additions to the mining industries of the Ottawa district may be mentioned those of the Du Lièvre Phosphate Mining and Milling Company. This company bids fair to do an extensive business, as its undertaking is a most timely one, and of such a nature as is likely to prove of practical economy to the producer as well as to the consumer.

Not long since a correspondent of the REVIEW had the privilege of going through the new mills and witnessing the "Blake" crusher and other machinery in operation, for which, and for the explanations given, we are under obligation to Mr. Geo. H. Bacon, the Managing-Director of the company.

After the phosphate has been broken into fragments of the size of a walnut, it is made to pass through a long inclined cylinder, heated to a high degree in order to rid the mineral of moisture, which feeds it into a crusher to be pulverized. It is then brought in small tin buckets on a belt, as is the case with flour in an ordinary grist mill, and gathered in bags for shipment. There are several grades of ground or pulverized phosphate, depending upon the pulverizer or crusher used. In one instance the ore when dried is made to fall into a revolving chamber, where, through friction and rapidity of motion, it becomes reduced to a minute or impalpable powder. This is the best and highest grade. Its fineness is exceedingly great, and it may be used as a fertilizer in its raw state to great advantage.

Many shipments of ground phosphate have already been made by the Du Lièvre Company, notably to St. Catharines, Ontario, to be used in grape culture, &c., and to the United States. It is not unlikely that agriculturists in the northern and western United States and the Province of Ontario will become large consumers of our ground phosphate in the near future, and a large demand may be looked for in Great Britain and Europe.

A number of buildings have been erected on the west side of the Rivière du Lièvre, in proximity to the crossing of the Canadian Pacific Railway, consisting of the cylinder and boiler-room, the mill proper and a store-room, all of which are admirably fitted up for the purposes for which they are required.

Under proper management this will no doubt prove a successful and profitable enterprise, and we hope its promoters will receive a large share of patronage from the agriculturists of the Dominion.

The annual production of gold in the world has been on the decrease for a number of years. California's production reached its height in 1853, and that of Australia in 1856.

NATIVE COPPER IN IRON PYRITES.—A curious mineral association is reported as occurring in the *Champion* copper mines in New Zealand. The copper ore occurs in the fissures of the alumina-magnesia silicate, known there as serpentine, and native copper is found filling all the fissures in the white iron pyrites, making it almost impossible to break such pieces with a hammer. These pyrites themselves contain only from 3 to 4 or 5 per cent. of copper. There are also good copper pyrites in the vein; but the native copper is rarely found in them, but is confined almost exclusively to the poor white pyrites.

MICA MINING IN CANADA

A GROWING INDUSTRY.

The British and Canadian Mica and Mining Company

OWNERS OF

THE BEST MINE IN AMERICA.

This industry has been engaged in in a desultory fashion more or less during the past ten years, and until within a recent date has been confined to deposits in Central Ontario. Throughout the Perth and Kingston districts, especially in the Townships of North Burgess and Longborough, deposits of amber mica of various shades occur, and from these there has been a limited annual production, which, for the most part, has been used to replace the better quality in stoves which have been for some time in use, or, in other words, for the purpose of repair. One deposit, however, in North Burgess, known as Pike Lake Mine, has yielded a very large quantity of excellent mica with so pale a tinge as to appear almost white when split to the required thickness for stove use. An almost unlimited supply can be obtained from

THE PIKE LAKE MINE,

and the product is far superior to any which has been extracted from the other deposits in the districts referred to. A fairly profitable trade was carried on by the owners of these mines until within the past two years, when the price of the higher grades of mica (*Muscovite*) were reduced on account of the discovery of extensive deposits in the United States and in other localities in Canada. Of these recent discoveries none have been recorded to compare with the deposit in the Township of Villeneuve, Ottawa County, which is now being worked by

THE BRITISH AND CANADIAN MICA AND MINING COMPANY.

This company own and operate what is known as the *Villeneuve Mine*, situated five miles east of the Rivière du Lièvre, and about twenty miles north of the village of Buckingham. The mine was acquired by its present owners in March last, previous to which it had been exploited only to a limited extent, but sufficiently to prove the existence of a vast body of feldspar and quartz intersected by micaceous veins carrying well formed crystals of mica in great quantity, capable of producing plates of various sizes from the ordinary dimensions required for stove purposes up to 10 x 12 inches.

THE QUALITY OF VILLENEUVE MICA

is not excelled in any part of the world; and this has been attested to by experts who saw the samples exhibited at the Antwerp Exhibition last year, and by those who have seen the samples now on exhibition in London at the C. & I. E.

In April last the British and Canadian Mica and Mining Company began active operations, and proceeded at once to develop their mine in order that they might be prepared to supply consumers with their requirements for the present season. No difficulty was experienced in convincing dealers, and others, of the superior quality of the mica, and as soon as they were satisfied of the capabilities of the mine, as regards quantity, the demand became so brisk as to tax the company's facilities for producing it to their utmost extent.

A mine cannot be developed in a few months, but under the superintendence of Mr. L. H. Shirley, C. E., the Managing Director, the mine is being put in shape to enable the company to employ a large force of miners. The micaceous leads are so extensive that the supply of mica is practically unlimited, and when more ground has been opened this mine will be capable of yielding all that will be required for consumption in Canada, as well as a large annual production for exportation.

Already many of the large stove manufacturers in Canada have obtained their season's supply from the Villeneuve mine, and a large quantity has been shipped to the United States where it competes with the North Carolina mica.

The B. & C. M. & M. Co. have organized with a view to carrying on a permanent industry in connection with their Villeneuve property, proof of which we have in the substantial character of the buildings which have been erected at the mine, the well constructed roadway thence, for a distance of five miles, to the river, and

THE CUTTING HOUSE AT BUCKINGHAM.

This latter feature is the most interesting addition to the company's property and is complete in all its appointments. No cutting-house in connection with any other mica enterprise in America can be compared to it. Each day's output is forwarded from the mine thither in crystal form and handed over to the sorters, splitters, cutters and packers who prepare it for market. To each man and woman employed in the cutting house is apportioned his or her special work, and everything in connection with the building has been so ingeniously arranged and thoroughly systematized that this branch of the business is conducted like clock-work. The difficulty at first experienced in obtaining skilled labour was overcome by importing

TRAINED HANDS FROM FRANKLYN, NORTH CAROLINA,

under whose instruction all the employees have become expert in the special work assigned them. Everything is conducted with a view to economy, and in this connection, it may be said, the company have very good prospects of establishing a profitable market for the feldspar, of which the gangue is, to a large extent, composed. Its superior quality makes it adaptable to the manufacture of porcelain, and its association with the mica renders it necessary to raise hundreds upon hundreds of tons in the ordinary course of mining. In addition to this, the distorted and fractured crystals, cuttings, and all waste mica is ground and sold to manufacturers of fire-proof paint, roofing cement and lubricants, and by utilizing these by-products the company will reduce the cost of producing the mica plates to a minimum.

The value of this property is no longer problematical; it has been thoroughly established, and of the mica, it may be said that its perfect transparency and its refractory nature, as well as the unusually large size of the plates obtainable, and the careful way in which it is cut, cleaned and otherwise prepared for market, has made a reputation for the product of the Villeneuve mine which must render it a source of large profit to its owners, of whom it is said, they possess THE BEST MICA MINE IN THE WORLD.

A New York scientist says that the earth's polar ice is penetrating the interior of the globe, like a wedge, and that as soon as it reaches the furnace there will be an explosion that will split the world into pieces too small for truck patches.

THE UPPER LIEVRE.

A Search for Gold and Silver now Going on in the Region.

It is only since the opening up and successful working of the phosphate industry that the attention of the outside world has been turned to the at one time avoided and rocky regions of the Lièvre Valley. Especially in the Upper Lièvre country is it beginning to dawn upon the few and far separated settlers that while nature has not been lavish in the bestowal of agricultural resources, yet she may have more than compensated for this by storing up mineral wealth in the vast masses of igneous rock that everywhere abound. With such a conviction Mr. William Riley Clement, of White Fish Lake, after a somewhat extended experience in the Huronian Gold and Silver mining regions, set to work with a will to search the rocks. It is quite probable that he will soon reap a tangible reward for his diligence and enterprise, as he has succeeded in discovering what seem to be very good specimens of both gold and silver quartz. These findings are located on White Fish Lake, in the townships of Bigelow and Bowman, and were last week inspected by Messrs. Edward Watts and Patrick Powers, of Buckingham, both of whom were very favourably impressed with the prospect, and who will likely be heard from in this connection shortly. Good specimens of gold and silver quartz have also recently been found on the properties of Messrs. William and Rodney Smith, at the upper end of White Fish Lake. A prominent phosphate miner and lumberman has already entered into negotiations with the latter gentlemen for the purchase of their claim.—*Aylmer Times*.

CORRESPONDENCE.

Editor Canadian Mining Review :

SIR,—Herewith find report of the manager of the Quesnelle Quartz Mining Company (limited). This mine is situated on Hixon Creek, Cariboo, British Columbia, about 43 miles north of Quesnelle Mouth. The property, as it now stands, consists of five locations of 1,500 feet each in length by 600 feet each in width, containing about 102 acres, to all of which the company have obtained a Crown grant, thereby giving them an absolute title, subject to taxation, as levied on all mineral property.

There are 300 inches (miners') of water recorded in favor of the Company. A five stamp mill complete, engine and boiler of about sixteen horse-power, are in place; also hoisting gear, wire-rope, necessary pumps, &c., for sinking 500 feet.

This mine was first located twenty years ago, but owing to excessive cost and lack of knowledge of such undertakings at that time, it was abandoned. Five years ago the present company was organized, and after expending \$32,000, found their manager was incompetent, in addition to which their funds were at a low ebb. The works were closed down, but not abandoned, as the company were satisfied that with sufficient means and a competent manager, success would crown their efforts.

The present manager, Mr. Koch, was engaged last October, and, in addition to the work as set forth in his report, put all the machinery and mill in place.

Yours truly,

JAMES REID,

(M.P. for Cariboo, and President of the Quesnelle Quartz Mining Co. (limited).)

REPORT.

To the Trustees of the Quesnelle Quartz Mining Company, (Limited.)

QUESNELLE, BRITISH COLUMBIA.

Gentlemen,—Yours of a late date requesting me to make a full report on the Hixon Creek Quartz Mine is to hand, and I will endeavour to comply with your request in such a manner as to be well understood by each one of you, and will be as explicit and impartial as possible in reference to the mining property you control. I am pleased to state that while I was not favourably impressed with the general surface appearance of your ground, I did not allow my prejudiced opinion to become fatal to my judgment whilst making a study of the ground as work progressed. I am now pleased to inform you that you have discovered, and to a limited degree developed, a true contact fissure vein. The surface being covered with a large amount of gravel sedimentary wash and mining debris, made it difficult to trace the course of the vein. After getting the machinery in place and pumping out the deep shaft (100 feet) I found that nearly all the quartz which has been mined and milled was taken from the cross veins, properly termed feeders to the main or true fissure vein; all of these have a general N. E. and S. W. course and terminate at the true vein; but, being in vein porphyry, they are irregular in course and size, and if in their course towards the vein they chance to come in contact with a large vein they are led off in a hap-hazard way through the porphyry until they come in contact with the true vein where they always terminate. To the west and south-west of the fissure the country rock is talc slate which forms the foot wall of the vein and into which the feeders never penetrate, always merging into and ending at the point where they intersect the true vein. At many places in the cross veins the ore assays very high, varying from \$25.00 to \$150.00 per ton. Between the two shafts, a distance of 160 feet, there are no less than ten large and small feeders traversing the country and intersecting the porphyry until they come in contact with the true vein. Again, in the tunnel, which is on the same course as the two shafts, the inner end being 450 feet distant from the furthestmost shaft, quite a number of cross veins, one of them measuring four feet in thickness, have been exposed, all of which have a N. E. and S. W. course toward the true vein. Some of these cross veins prospect very rich in gold, thus showing 450 feet of vein ground prospected and thickly interspersed with strong veins, or feeders, containing gold. All ground lying N. E. of the vein, for a distance of 50 or may be 1,000 feet, is vein porphyry, composing the hanging-wall of the fissure, impregnated with gold, iron, copper and silver, independently of the large and small veins which serve as feeders to the main fissure vein.

The vein is what is termed a true fissure vein and also a contact vein, and in California, Montana and Idaho, mining men cannot be induced to invest in a silver or gold vein, unless it is a true fissure vein, whilst others seldom have unlimited confidence in a vein unless it is not only a true fissure but also a contact vein. When a pay chute of gold quartz has been discovered in a fissure or contact vein it is likely to continue for several hundred or a thousand feet along the vein and to an indefinite depth, giving perfect assurance of a valuable mine. I am pleased to inform you that the main vein of your property on Hixon Creek, so far as developed, proves to be a true fissure contact vein, between slate and vein porphyry walls.

I will now give you a description of your mine so far as developed. The extreme S. E. work on one of your claims is a shaft 150 feet deep on a vein of quartz which yielded well in free gold. At a depth of about 20 feet this vein dipped to the S. W. and away from the shaft. The shaft was continued vertically and at a dept of 100 feet a level was driven to the S. W. until the contact between the slate and porphyry was reached. Several veins which paid well were exposed by this work, but, not knowing that a vein existed at the contact, your manager very naturally mined and milled the ore from the veins in sight. I am informed that, subsequently, a misunderstanding arose between the manager and the company which led to the suspension of work.

As soon as I was entrusted with the management of your property I placed the machinery at the shaft which you had appeared to know most of (so far as you had been informed by the former manager and others), rather than at a shaft only 50 feet deep and which had been sunk twenty years or more ago. In the course of my investigation of the shaft I discovered the contact of the slate and porphyry, but no vein, and being totally ignorant of the character and formation of the country I proceeded to open up ground by drifting through the porphyry and cross-cutting the slate in search of a more permanent vein than any of those which had been met with. Meeting with no success, beyond cutting through many small veins (some of them rich) in the porphyry, I concluded that a true fissure vein existed near by which controlled the movements of such a network of small veins, and into which these small veins would eventually find their way and act as feeders to it. I then proceeded to examine the other shaft, 160 feet to the N. W., and at a depth of 50 feet I discovered a drift which had been driven for 88 feet in the direction of the other shaft in vein porphyry. This drift intersects ten quartz veins, the largest two of which have been driven on to the S. W. until they ran into what I have discovered to be the true fissure contact vein. From this vein the quartz of the neighboring country has its source, and the millions of dollars of gold taken from the placer diggings of Cariboo have their origin in this and other true fissure veins of the district.

The vein is contained between talc-slate and porphyry and into it the two cross veins, or feeders, have been deposited. Beyond the fissure vein, and in the slate, not a sign of quartz is to be seen, proving not only its true and permanent character, but also that all the cross veins in the 88 feet drift and those at the bottom of the shaft serve as feeders to it. The vein proper has a N.W. and S.E. course and dips 75° to the N.E. with the vein porphyry acting as a hanging-wall and the talc-slate as a foot-wall. The tunnel, at a distance of 75 feet from the last mentioned shaft, has been driven 200 feet into the mountain and, like the two shafts, exposes many seams of quartz in the vein porphyry all trending towards the contact and several of them have been followed for short distances in its direction.

After making a careful survey and study of the formation and character of the vein at and near the bottom of the 50 feet shaft, where the true vein had been exposed to view, I decided to sink a shaft near the entrance to the tunnel. At a depth of 16 feet I encountered the slate in which I proceeded to drift in the direction of where I considered the vein would be found encased between the slate and porphyry. Continuing for 16 feet I came upon the contact with the vein standing up at an angle of 75°

surrounded and covered by surface slide and debris. At this point the vein is wide, well formed and contains more or less quartz. Its present appearance leads me to the belief that it will develop into a splendid gold mine and will make larger and become more reliable as a regular producer, as it leads N.W. and into higher ground. Another shaft can be sunk some 300 or 400 feet to the N.W. which will open up a very large extent of the vein and eventually make a thoroughfare and serve to ventilate the mine. The shaft I am now sinking is 8'4"x3'8" (inside of timbers), double compartment, timbered and properly secured. I have good and substantial hoisting frame over it for steam or water power. I have remodeled the water power and am now utilizing it for hoisting purposes. The shaft is now down 20 feet on the vein and the vein matter becomes harder as we go deeper. Much quartz is coming in (quartz belonging to the vein), while we are never without the quartz that cuts in from the porphyry, thus showing that we are in the midst of mineral.

I am very confident of being able, at no distant period, to supplement the foregoing with a report of good milling quartz in abundance.

G. A. Koch, Manager.

CANADA'S MINERAL WEALTH

REPRESENTED AT THE
COLONIAL AND INDIAN EXHIBITION.

The Display Attracts much Attention and the Richness of our Ores Creates Surprise.

No event has occurred in recent years so likely to promote the interests of Canadian industries as the Colonial and Indian Exhibition now in progress in London, England. The display of the product of the mine, which so well represents the mineral wealth of the Dominion, has attracted the attention of mineralogists and capitalists of the old world who will doubtless institute further investigation and ultimately be induced to advance capital to aid in the development of our vast mineral deposits. Nature has provided us with all the natural elements of national wealth and prosperity, and the C. & I. E. may be the means of furnishing us with those artificial elements, capital and enterprise, which are so indispensable to the successful development of great mining industries. The *Canadian Gazette* has been nattering in commenting on the Canadian exhibits, of which it speaks in the most laudable terms, and of Canada's mineral display it says:—

THE PRECIOUS METALS.

Among the gold exhibits the obelisks form a leading feature. The British Columbian structure contains 252,000 cubic inches, and represents the amount of gold taken from auriferous deposits in the Province during the last twenty-five years, of a total value of \$49,342,900. The Nova Scotian obelisk represents a total of 395,180 oz. obtained in the Province up to date, of the value of about \$7,500,000. Many interesting specimens of alluvial gold from different parts of the Dominion are also shown in a case in the approach. Among them is one from the parish of St. George, Beauce County, Quebec, found in an old river 200 feet below the surface. The specimens from Granite Creek, Similkameen River, British Columbia,

are the largest from the Province, and from a new district that promises well. A handsome sample in quartz comes from the Albion gold mine of Montague, Nova Scotia. Exhibits of gold-bearing ore may also be seen from the Huronian mine, in the region of Port Arthur, of which so much has been heard of late years. Of silver the chief exhibits are made by Mr. T. A. Keefer, thanks to whose enterprise a most comprehensive and interesting mineral collection is shown from Port Arthur, in twelve handsome cabinets made of wood found in the same district. The silver from this region is, it will be noted, not so much native silver as blends with copper pyrites, &c. A large number of veins have been discovered in various parts of the district, from most of which specimens are shown; but little has been done in providing capital and enterprise to develop the industry. The Beaver mine has as yet been worked to the largest extent.

PHOSPHATE AND ASBESTOS.

There are, however, in the whole collection few exhibits of more practical interest to Englishmen at the present moment than those of phosphate of lime, or apatite, as it is at times called. The development of the trade in this mineral is most remarkable. In 1873 but 195 tons were obtained from the Ottawa mining district, where the chief bearing rocks are found; in 1883 the supply had reached 19,466 tons; and last year the total was 23,908, with every prospect of as great advance in future years. From the Emerald mine, Buckingham, Quebec, a crystal is shown some twenty inches in width, probably the largest individual apatite crystal yet found. In quality the mineral is one of the richest known, very similar to the phosphate of Norway, and yielding a high amount of phosphoric acid. For instance, the South Carolina phosphates give 40 to 50 per cent. of phosphate of lime, while in the Ottawa region a carefully conducted mine yields upwards of 80 per cent. It is now largely exported to Great Britain and Germany, and already practically holds the field, with the exception of the product of Norway, for the Spanish phosphate is of a different nature, with a different method of occurrence. Another most interesting exhibit is the case of the Anglo-Canadian Asbestos Company of Montreal, devoted to the mineral in its crude and manufactured state. First is the raw asbestos, then powdered for the manufacture of fire-proof paints, also woven into tape, wick and rope—in short, it can be made into almost everything into which cotton is manufactured. The fibre of the Anglo-Canadian Company's asbestos is comparatively short, but the exhibit of other firms, such as Messrs. Johnston & Sons, from the same district of the Eastern Townships, is larger and more similar to the Italian article with which Canadian asbestos has to compete in European markets. No general statistics are apparently available as to the extent of the output, for the industry is a new one; but the demand is such in Europe alone that few better investments could be found. Some of the chief mines are at present worked by Americans, and indeed throughout Canada it will be found that English money, which should perhaps be first, is often last in developing industries of a similarly profitable nature.

MINOR MINERAL EXHIBITS.

Mica and soapstone are also well represented among the exhibits. The latter is attracting much attention as a stone where great resistance to heat is acquired, such as in stoves. The material now in use in Great Britain comes chiefly from Germany, and from what practical

Englishmen who have examined the samples say, there is every reason to anticipate a good export trade in the Canadian article. The mineral is found in the same district as the asbestos. Graphite is another mineral possible of large development in Canada. The largest exhibit is that from the Buckingham (Quebec) plumbago mine, comprising disseminated ore, pure lump plumbago from as many as fifteen different veins, and various manufactures. Few people, for instance, would think of asking in English shops for Canadian lead pencils, and yet they may be seen to be at least as good as those in general use, and probably quite as cheap. Crucibles and such-like manufactures of no little variety are also made of this mineral. Of precious metals the Mineral Court can also show specimens of much excellence. The amethysts from Thunder Bay shown by the Canadian Executive Commissioner and by Mr. Keefer are remarkable for their size and beauty. Canadian freshwater pearls are well shown by Mr. G. Seifert, of Quebec, in a small case in the approach. These pearl mussels are found in most of the small streams of Quebec, and weigh from 3 to 70 grains.

It will thus be seen that the Canadian mineral exhibit is one of great interest and merit. It is also a very practical effort to encourage English capitalists to assist in opening up some of Canada's immense wealth. Some English money has in the past been embarked on mineral ventures, and many such have failed. The cause of this is obvious. In the first instance far too large a sum has often been given for the property—so much so as in many cases to make profitable working only possible in the remote possibility of the mine proving a true "bonanza." With, however, proper care and judgment in the purchase, and economical and experienced working, there is great field in many directions for the profitable employment of English money in the Canadian mining industry.

CANADIAN GEOLOGICAL EXHIBITS.

Probably no Canadian industry has suffered so much from over-speculation, and in many cases from gambling, than that of mining. In deed, among certain classes the industry has been regarded in no other light, until the impression has found wide acceptance, if not in Canada at least in Europe, that the honest investor had best keep himself free from attempts to derive from it any permanent and satisfactory source of revenue. The display at the Colonial Exhibition is eminently suited to dispel such an illusion, and it will do so by showing clearly enough that, while in mining, as in lumbering and farming, absence of practical knowledge and capital have in the past led to many unprofitable ventures, yet the native material, comprising 97,000 square miles of coal-bearing rocks, is such that mining may and will be made in Canada, as it is in the older countries of the globe, a steady and increasing source of wealth.

The mineral exhibits occupy a large space in the annexe to the approach to the western transept of the Central Gallery and in the approach itself. The collection numbers upwards of 725 specimens of ores and minerals and their products, and was for the most part gathered during the past year in all sections of Canada by the Dominion Geological Survey. It is under the charge of the Director of the Survey, Dr. Selwyn, assisted by Mr. F. D. Adams and Mr. C. Willimott.

THE COAL WEALTH OF CANADA.

Treating the exhibits in the natural order into which they seem to fall, one finds in the approach an immense block of bituminous coal

from the Wellington mine, Vancouver Island, representing the whole thickness of the seam. Another block is from the Nanaimo mine. These two are the most important mines of British Columbia. From the former, 220,000 tons were obtained last year, worth \$4 per ton at the wharf; while from the latter the output was 137,500 tons, and, considering the sparseness of the population, this is a fair development. There is also bituminous coal from Vancouver Island and from the Union mine, Comox; and anthracite from Queen Charlotte Islands, interesting as the only known deposit of its kind on the Pacific coast. The extent of coal in British Columbia is but partially ascertained, and yet enough is known to show that the supply is practically inexhaustible. Its market is at present in Victoria, San Francisco, Honolulu, and Alaska, but it is greatly restricted for want of enterprise and transport facilities. In this respect much is hoped for from the completion of the Canadian Pacific Railway in opening up profitable markets, not only in the prairie cities of the Canadian North-West, but also in China and Japan, where the supply is now largely met from Australasia. As one passes from the Pacific coast eastward the deposits tend to a lignitic nature. From Banff, on the line of the Canadian Pacific Railway, in the mountains, a semi-anthracite is obtained, as may be seen by the specimen shown. The Banff mine, which is known to comprise two seams of about 4 feet in thickness, has but recently been discovered. In quality the fuel compares with some of the best anthracite in Pennsylvania, and is about to be mined in such a way as to ensure its extensive use. Further west on the line of the great coal-bearing rocks of the North-West comes the Lethbridge mine. This is now being actively worked by the North-West Coal and Navigation Company in connection with the operation of the railway from Dunmore, on the main route of the Canadian Pacific Railway to Lethbridge. The specimen shown from the Galt mine, as it is popularly called, is from a seam 5 feet 4 inches in thickness, situated so near the surface as to obviate the necessity of any shaft, and make working a simple and comparatively inexpensive process. The extent of this coal region is enormous. At Lethbridge alone the quantity underlying one square mile is estimated by Dr. Dawson at five million tons. And it must be clearly borne in mind that the Geological Survey has only as yet examined the southern regions of the plains, which form one vast coal bed tending from bituminous to lignite as one proceeds from west to east. The coal shown by Messrs. Pocock, Freath and Pocock, from the Souris Valley, Southern Manitoba, is thus a lignite with about 20 per cent. of water, as against about 10 per cent. in the Lethbridge coal. And yet the Souris coal is of the utmost value to settlers, and also in view of manufactures, for the fuel used by the Germans for like purposes is to a large extent much inferior.

From Ontario and Quebec no specimens are forthcoming, because no coal is found in those provinces. New Brunswick sends but one exhibit from Grand Lake. This coal lies near the surface, and the seams are so thin that, seeing the close proximity of the vast coal areas of Nova Scotia, it is used only for local purposes. The extent of the coal fields of Nova Scotia may be gathered from the fact that last year the total output was 1,352,000 tons, and the local Government have done well in seeing the province so well represented as it is. In all thirteen mines contribute—the Sydney, Bridgeport, Reserve, Glace Bay, Gowrie, Old Bridgeport, Springhill, and Albion, and the mines of

the Low Point Barasois and Lingan Mining Company, the Joggins Coal Mining Company, the Vale Coal Company, the Acadia Coal Company, and the Intercolonial Coal Mining Company. The coal is of the true bituminous class and of immense extent, at present worked to supply the demand of the Maritime Provinces and as far west as Ottawa, beyond which it is not at present profitable to send it.

IRON AND COPPER EXHIBITS.

The exhibits of iron comprise every kind of ore from all parts of the Dominion, Nova Scotia prominently, as well as New Brunswick, and parts of Quebec, Ontario, and British Columbia. From the largest iron works in the Dominion, Londonderry iron mines, of Colchester, Nova Scotia, a good exhibit of ores and products is made. In quality Canadian, and especially Nova Scotian, iron must be considered a great deal better than the general run of English iron. It is, in fact, very pure and rich; the magnetites compare somewhat with those from which the celebrated Swedish iron is made. And an idea may be gained of the immense market available in the Dominion itself for this abundant metal from the fact that in 1884 the iron and steel imported into this country in various forms reached a value of \$14,790,727, and the total of imported iron and steel during the seventeen years since Confederation amounts to a value of no less than \$230,741,434, a demand which the resources of Canada are well able, with proper development, to meet. Sulphites of copper come from Quebec, British Columbia, and Ontario, the latter including two exhibits of native copper from the Lake Superior district, which should, now that it is opened up by the Canadian Pacific Railway, attract capitalists to work what is declared to be one of the most extensive copper deposits in the world. Of antimony some fine specimens are shown from Rawdon, in Nova Scotia, as well as from Prince William, New Brunswick, from which much is hoped.

There can be no doubt but that the mineral exhibits have aroused considerable enquiry among visitors generally to the Canadian section. The specimens of iron ores, manganese ores, asbestos, soap-stone, graphites, and granites have attracted particular attention, and there have arisen several offers to buy largely if satisfactory quotations can be obtained. In all such cases inquirers are put into direct communication with the Canadian producers. One gentleman who has carefully examined the iron ores recently, is about to leave for British Columbia to erect, at considerable cost, works for smelting purposes. Mr. Sugg, of the Vincent Works, Westminster, a member of the well-known firm of gas engineers, has also recently been placed in communication with the miners of soap-stone in the Eastern Townships of Canada. Large quantities of this material are at present imported by Messrs. Sugg from Germany for use in their works, and it is hoped that an article of as good, if not better, quality may be obtained from Canada at favourable prices. Other inquiries have related to Canadian ochres, and many samples of this mineral have been furnished for experimental purposes and for report to the Geological Survey.

While workmen were engaged in blasting rock recently at the limestone quarry at McAfee, in Orange County, New York, a seam in the rocks was opened, in which was found a number of bones among others some that are alleged to be those of a man. There are pieces of the vertebrae of an ox, and a piece from some huge beast's jaw containing a tusk.

Progress in the Development of Canada's Mining Industries

DEPICTED BY

ALFRED R. C. SELWYN, F.R.S., F.G.S., C.M.G.

Director of the Geological Survey of Canada.

The collection of the economic minerals of Canada forms one of the most interesting and important exhibits at the Colonial and Indian Exhibition, and is strong evidence of the progress in the development of the country's mineral resources since the displays made at the Philadelphia Exhibition in 1876 and at the Paris Exhibition in 1878, in both of which the Director of the Survey took a prominent part. In comparing the collection now on exhibition with those displayed in Philadelphia and Paris, Dr. Selwyn, speaking on the subject, is reported to have said:

"The exhibits are much more numerous, to begin with. We have here upwards of 725 specimens of ores and minerals and their products, whereas at Philadelphia we had but 487. Then our space is double that at Paris, and larger than at Philadelphia. The exhibits themselves are, I consider, finer, too, and of a more practical nature. It is also a great help to have the exhibits concentrated in one Mineral Court as we have here, instead of separated in the general display as at Philadelphia. Then, again, we had, in 1878, practically none of the fine asbestos and much less of the phosphate exhibits than we now show, for the important industries in these minerals have greatly increased."

He says, in referring to the

ASBESTOS AND PHOSPHATE DEVELOPMENTS,

"The market is unlimited: it is merely a question of capital to open up and develop mines. The workings are confined to one district—the eastern townships—where asbestos and soapstone lie very much together. Of course it is found elsewhere, but, so far as known, these are the only deposits of mercantile importance. As to quality, I am informed that the Canadian asbestos is quite equal to that produced anywhere, though not quite so long in fibre; but the fineness of the fibre and its quality are said to be quite as good for all practical purposes. It is now manufactured in Canada, and owners of mines would do well to remember that in exporting the raw material they are really exporting a good deal of refuse and refuse, too, that has to pay freight. Manufacture the asbestos before shipment, in accordance with the requirements of European markets, and the advantage will be with Canada all round. Of course capital is wanted for machinery and the facilities for manufacturing; this is the great difficulty, for exporting the raw material means small outlay and quick returns, which is a consideration to many owners. But, if taken up by men of capital in a reasonable way, and properly managed, the manufacture should offer a good opening for investment and be conducted with complete success. The trouble is, that the moment any English or American capitalists try to buy mining property in Canada, the owners say to themselves, 'Ah! there must be something exceptionally valuable here,' and they cannot open their mouths wide enough. The consequence is, as many instances have proved, the capitalists will not look at the property, knowing full well that the price is unreasonable; or, if they purchase, they often find it impossible, unless it prove a real 'bonanza,' to work it at a profit, and at last give up the undertaking in despair,

to the disparagement of the property and the industry. The most owners of Canadian mining property are not willing to make what seem to me reasonable and fair arrangements, such as royalty on the output, or to make the purchase conditional upon the result of the workings coming up to expectation.

"When I speak of the asbestos workings being confined to one district, it is a Canadian, not an English district, to which I refer. An English district is at most a small affair, but a Canadian district may be pretty well as large as half of England. The asbestos district, for instance, in the Eastern Townships is about 200 miles in length, and, I suppose, some six to eight miles in width. It is, therefore, a vast area.

"With regard to the phosphate deposits in Canada, the way they are being developed is shown by the growth of exports. I can see no limit to the depth of the deposits. Of course there is a limit to the depth at which profitable workings can be carried on, but practically there is no limit to the supply, for it extends over an enormous area horizontally as well as in depth, and must take centuries to exhaust."

PROGRESS IN COAL DISCOVERIES.

"The discoveries which have been made in coal during the last decade are entirely confined to the North-west and Rocky Mountains. There is no doubt that the North-west deposits are all that could be desired in every possible way. The Souris coal is a lignite; but the coal from the North-west Territory is found on the upper branches of the two Saskatchewan Rivers, away to the foot of the mountains, between Medicine Hat and Calgary, and even west." The question of freight is an important one and in this connection I understand the Canadian Pacific Railway is carrying the North-west coal at a cent a ton per mile, and the result of the opening of the mines has already been to bring the price of coal in Winnipeg from \$18 to \$7½, and proportionately cheaper as one goes west. The people in Manitoba now use about as much of North-west coal as they do of that from Ohio and Pennsylvania. Some say the American coal is slightly better, but the Canadian article should certainly supersede it in the towns of Manitoba. Government can easily effect such a change, and a little patriotism on the part of residents would also do it. This is a patriotism that pays and benefits the whole country—at least, it must seem so to those who can look beyond their own noses. As to quantity, there is certainly enough coal in the North-west to supply the country for centuries; of that there is not the slightest question. The Canadian Pacific Railway Company is now itself using the Saskatchewan coal in the place of the American, which comes in by way of the lakes to Port Arthur. As to the Bauff semi-anthracite deposit, of which so much has been heard, we hardly know the quantity as yet, and are not quite certain whether the deposits represent several seams or only one. It may possibly be that one single seam is folded, so that the two or three deposits represent several seams or only one. It may possibly be that one single seam is folded, so that the two or three deposits found at different spots are but parts of the one folded seam, and not individual seams of themselves. This question of course largely affects the quantity.

DISCOVERIES OF OTHER MINERALS

have not, for the most part, been very extensive. One very fine deposit of antimony was found at Rawdon, in Nova Scotia, in 1883, and also some manganese at Walton and Cape Breton in the same Province, where mines were opened in

1880. In the Port Arthur district, however, very considerable discoveries of silver ore have been made, and many of them promise to be very important, especially in the Rabbit Mountain district, about 28 miles west of Port Arthur, near White Fish River. Much has been said of this district but the actual results of mining have been small so far, accounted for by the bad condition of the roads which makes it difficult to get to the mines at present. It is a curious fact that a similar mining excitement arose fourteen years ago much nearer Port Arthur. A great number of silver mines were reported; splendid specimens were taken out of native silver and sulphuret of silver. Capitalists spent large sums of money, but the ventures were not successful. And yet these veins look just as promising as any I ever saw in my experience; but I cannot explain what seems hitherto to have been the unsatisfactory result in the older mines, such as Pie Island, Thunder Bay Mine, and others."

For the Geological Survey to undertake exhaustive examinations of the veins, to ascertain their exact extent, and thus enable capitalists to judge, would involve a great outlay, and difficulties would arise between the various owners; and then, if you ascertained a fact concerning one mine, it would prove nothing as to another. The matter is therefore, we think, better left to private enterprise.

"The only discoveries in the Rocky Mountains are on the west side, in British Columbia. Granite Creek, for one, has a very rich alluvial gold field; and doubtless many other creeks in the region from immediately west of the summit of the Rockies to Kamloops; but here, as everywhere else in Canada, they are waiting for capital."

AMERICAN VERSUS ENGLISH ENTERPRISE.

"If I remember rightly, the British Columbia Government have sold to Americans the whole of the coal lands along the eastern coast of Vancouver Island around Nanaimo. It is here that the men-of-war coal. And through the whole country mining and other industries are often largely, or entirely, worked by American capital. This is so, for instance, with one of the greatest lumber manufactories in Canada—that at Hull, Ottawa—which is, to some extent a slight upon English enterprise. But American capital is more plentiful than Canadian, while distance and ignorance of the country operate against the introduction of English capital. It is to be hoped, however, that much of this want of knowledge of the undeveloped resources of Canada, and the opportunities they offer for profitable investment, will be removed by means of the present Exhibition."

DIAMONDS IN NEW SOUTH WALES.—Diamond mining in New South Wales is likely to become of much importance. Upwards of 12,000 diamonds are reported to have been found up to the present time. They have been chiefly obtained from the Tertiary gravels and in the more recent drifts, in the Bingera, Inverell and Cudgegong districts; and a few have also been found in the Mittagong, Wellington and Uralla districts.

The production of chemical manure from the slag of Thomas-Gilchrist steel works promises to be successful in Belgium. Works have been started near Liège, which use all the basic slag from the Angleur Steel Works. Hitherto all that has been done is to pulverise the slag, and after roasting, the ground slag is sold to works where the natural phosphates of Hainault are dealt with, no difficulty being experienced in finding a market for it.



MINING NOTES.

NOVA SCOTIA.

On the 20th ult. the property belonging to the Blockhouse Mining Company, Cow Bay, Cape Breton, was put up at auction by order of the Commissioner of Mines, and sold for \$7,000.

The order, which was for unpaid royalties amounting to some \$12,706.35, dated as far back as June, 1885.

It is rumoured that the Government purpose taking up the rails and machinery with a view to abandoning the mine. If this is so, and the mine is allowed to fill up, many hundred thousand tons of coal can never be reclaimed.

Recent reports show that the works of the New Albion Gold Mining Company of Nova Scotia are at present at a standstill, gold in the worked leads having given out. Strong hopes are entertained that capital may be raised to develop other good leads on the property, but a report that an effort in this direction had proved successful lacks confirmation. It is unfortunate that the first Nova Scotia gold mine to receive English capital should have proved so far unsuccessful. Great results were expected from it, and these expectations were fully justified by the outlook when the property was sold. In July the stock was quoted in London at from \$4.50 to \$4.75, but according to advices during the latter end of August it sold at from \$1.25 to \$1.87½. Had the venture turned out well a great stimulus would have been given to English capitalists to invest in the mines of this province.

PORT ARTHUR.

The *Miner* has changed hands, and is now published by Mr. I. Dickinson.

Mr. Harvey, of Toronto, has given encouraging tidings regarding the mining property near Mackenzie Station on the C. P. R. east of Port Arthur. The vein recently discovered is said to be four feet wide at the surface, carrying galena and zinc blende, the same as 3A mine. It is also stated that a syndicate of English and Hamilton capitalists will work the property.

The works at the *Porcupine* mine now consist of a shaft on the northeast side, which is down about 60 feet, and on the southwest side the vein is stripped from the top to the bottom of the hill for 100 feet with four drifts into it, and the ground stopeled out between the centre drifts, thus exposing a large body of ore to view. Recent specimens brought in show pink and green quartz and fluor spar, full of heavy black silver—argentine. The *Miner* says it has long been the opinion of mining experts that the cross vein at the Beaver, which has proved so rich, the *Silver Creek* vein and the *Porcupine*, are all one, and the finding of the rich pink and green fluor spar seems to set the matter at rest.

During their recent visit to Port Arthur Sir John and Lady Macdonald and party visited the office of Mr. T. A. Keefer, and at the request of the Reception Committee inspected a very fine collection of specimens of the mineral wealth of the district.

The arrangement of the minerals was complete. On the first table in one row were arranged rich specimens of ore, lead, zinc, copper and gold and silver-bearing ores. In another row other economic minerals were shown, viz, free stone, asbestos, mica, roofing slate, marble, serpentine, Neepigon sandstone, and baryta; and in other places solid nuggets of native and black silver, and nuggets of gold in the rock; all from the district of Thunder Bay. This table had a card on it which reads as follows: "Table exhibiting some of the minerals found on the North Shore of Lake Superior, near Port Arthur."

In the centre of the next table there was written on a large card the following: "The working ores of the working mines near Port Arthur," underneath which was written the following: "To work with assured success and to increase the output of these mines a railway is essential. We need increased or special Government aid." On this table were exhibited the working ores of the following mines: The *Huronian* gold and silver mine, the *Rabbit Mountain* silver mine, the *Porcupine* silver mine, the *Beaver* mine, the *Jarvis Island* silver mine, the *Silver Mountain* East End mine, the *Silver Mountain* West End mine, the *Crown Point* mine, *McKellars Island* baryta mine, the *Chicago & Verte Island* sandstone quarries, *Silver Falls* silver mine. On this table were also shown the *Huronian* mine mill concentrates and a brick of silver from *Rabbit Mountain* mine. On a third table there was written on a large card placed in the centre of it the following: "Surface ores of proposed mines near Port Arthur," underneath which was written, "To successfully develop these prospects a railway is essential. We need increased or special Government aid." Around this table were surface specimens from the following prospects: the *Highland* gold and silver, the *Neebish* gold and silver, the *Kam Kam* gold, the *Tip Tap* gold, silver and copper, the *Big Bear* silver, the *Little Pig* silver, the *Indian* silver, the *Palasides* silver, *Slate River* silver, the *Parnseau* silver, *Rabbit Mountain, Jr.*, silver, *Corbett* and *Crawford's* silver, *Melottes* Black Bay argentiferous galena, and the *Zenith* zinc mine.

On another side of the office were shown varieties of ores in large masses and quantities, and the gold-bearing and silver-bearing slates of the district, together with a very fine collection of photographs of all the working mines, taken by Mr. Barrie.

There were also on exhibition *Huronian* mine mill concentrates in bags, also trees cut down by beavers from the *Beaver* silver mine, and a number of interesting geological curiosities.

Sir John expressed his great surprise at the variety and richness of the minerals, and each of the party carried away some fine specimens as mementos of their visit.

Notes on the Progress of Mining in Europe.

By E. J. BALL, PH. D.,

(Assistant in Metallurgy at the Normal School of Science and Royal School of Mines, London.)

Written specially for the *Canadian Mining Review*.

After an enquiry which has lasted seven years, the Report of the Royal Commission on Accidents in Mines was issued on April 10th. It is of considerable length and gives the results of a large number of experiments made to determine the best methods and appliances to be adopted in order to obtain increased safety from accidents in mines. It is stated in the report that with regard to the firing of shots, electrical exploding appliances present import-

ant advantages over their competitors, and it is added that the experiments instituted to show the percentage of fire-damp that might be present in the air without rendering it explosive, showed that 4 per cent. and upwards might lead to dangerous explosions, while if coal dust be simultaneously present the danger is still further increased. The commissioners recommend the use of Livings' Fire-damp Indicator, and they advise: 1st. That all work involving blasting in mines should be entrusted only to experienced workmen. 2nd. That in order to lessen the risk from blown-out shots, particular care should be taken that each shot should be assisted by under-cutting and nicking or shearing whenever it is practicable. 3rd. That the tamping, stemming, or ramming should consist of very damp or non-inflammable material. 4th. That, where strong tamping is needed, the compression of air at the bottom of the hole should be avoided by pushing in the first part of the tamping in small portions. 5th. That, where safety lamps are used, and powder is employed, the shots should be fired only by specially appointed shot-men, who, before firing the shots, shall satisfy themselves that the foregoing instructions are observed, and shall also satisfy themselves by carefully examining all accessible contiguous places within a radius of twenty yards of the shot to be fired, that fire-damp does not exist to a dangerous extent. The commissioners further add: "That it is most important that all mines should be carefully examined by means of indicators capable of detecting as small a proportion as 1 per cent. of gas; such examinations to be made before the announcement of each day-shift, and, in case of an interval, also before the succeeding shift, and that in all dry mines where the air may be laden with coal dust, and where fire-damp is either known to be given off from the strata, or may from experience be reasonably expected to exist. The Secretary of State may require safety lamps to be used, unless the owners and workmen of such mines prove, to the satisfaction of a Court of Arbitration to be appointed by the respective parties, that less liability to accident generally will be involved by the working of the mine with open lights than by the use of safety lamps. It should be a special instruction to such Court that the circumstances of each mine be taken into consideration."

In drawing attention to the experiments which have from time to time been made with a view to reduce to a minimum the inflammable action of a shot, H. Stapenhorst remarks that the results attained have been more satisfactory when dynamite was the explosive agent than when powder was employed.

As a complement to the discussion which has been carried on at such a length of late as to the action of coal dust in tending to produce, or in intensifying colliery explosions, the Austrian Government has offered a prize of 1,000 ducats for a process for getting coal which shall be free from all danger of explosions, and which must be neither costly nor troublesome to employ. The process may either do away with shot firing altogether, or it must be of such a nature as to prevent all danger from shot firing in dusty or fiery mines. Existing methods may compete, and all projects must be forwarded to the Berg-hauptmannschaft in Vienna before the end of the present year. Amongst the methods which have of late been proposed for the purpose is one described by Dr. Kossmann of Breslau, in *Oesterreichische Zeitschrift für Berg und Hüttenwesen*. He proposes to replace the ordinary dynamite or gunpowder cartridge by one in which the force is exerted by the rapid evolu-

tion of hydrogen due to the action of sulphuric acid on zinc dust. The case of the cartridge is divided into two chambers, the inner of which is filled with the zinc powder and the outer one with the sulphuric acid, the shot being fired by a blow on a pin forcing out a plug, and so opening a passage between the two chambers. The process is stated to be inexpensive.

In the same Journal it is stated that comparative experiments with compressed and with ordinary powder, recently officially carried out at Wieliczka, ended in favor of the compressed powder.

With regard to the various new forms of explosives, hellhoffite, mention of which was made on a former occasion, is stated to consist of one part of dinitrobenzole and 1.5 part nitric acid, or of one part of nitrobenzole and 2.5 parts of nitric acid. It is a dark red to brown colored liquid, and was originally used in thick glass or paper cartridges, but was afterwards employed after absorption by kieselguhr, and in this state it possesses considerable advantages over kieselguhr dynamite, both as regards lessened danger in the firing of gas or dust in collieries, and in producing a greater proportion of large coal; further, it is not so liable to sweat as the dynamite is, and even if the oil does become free, there is not much danger, as it cannot be exploded by concussion. The gasses also, which are produced on explosion are less noxious than those produced by dynamite. Hellhoffite, however, is liable to become decomposed after the lapse of a comparatively brief interval of time, and its manufacture has consequently been abandoned, another explosive—carbonite—being introduced in its stead. This material, while not being subject to decomposition, possesses all the relative advantages of hellhoffite, like which it also consists in part of nitrobenzole. It is also cheaper than all those other explosives, which, as is stated to be the case with carbonite, do not cause explosions in the presence of ten per cent. of fire-damp.

The experiments of A. Kás on the tensile strength of wire drawing-ropes were divided into three classes: 1, new ropes; 2, ropes already used but free from broken strands; 3, old ropes with some strands broken; this third class being again subdivided in connection with the position of the broken strands. A large number of experiments were made with several varieties of ropes and the results are given in tabular form. The author remarks that his experiments show that the tensile strength of the wire used in the manufacture of wire rope, far from being diminished, as has been supposed, by the twisting together of the wires, is, in reality, somewhat increased by that operation.

In a paper recently read before the Mining Institute of Scotland, Mr. A. Hill describes the Rio Tinto mine and discusses generally the mining industry of the province of Huelva, in the south of Spain. That portion of the province through which the mineral zone of the Sierra Morena passes is about 100 miles long and 40 miles in breadth, and it consists principally of Palaeozoic schists associated with feldspathic quartz, porphyry, and granite. Ores of copper, lead, zinc, and manganese, are found in considerable quantities. There are large masses of cupriferous iron pyrites and the more important ones, at Rio Tinto and elsewhere, are all worked by open-cast, although in several of the mines ordinary pillar and stall work is also carried on in those portions of the mass where the overburden was too deep to be cheaply removed. The deposits at Rio Tinto are fully described, as are also the methods of mining

adopted, and the metallurgical treatment of the ore. This last is very simple as it chiefly consists in heap-roasting and then washing out the copper sulphate, the copper being thrown down by iron.

In another letter read before the same Institute Mr. J. S. Dixon gives the results of a large number of experiments he has made at the Bute Colliery on the subject of the amount and mode of occurrence of subsidence and draw from working the coal. The examination related to the working of the Ell coal, which the author states was worked stoop and room up until the middle of 1881, when stooping was begun, but it was some time before it reached the line along which the section was taken. The excavation, which is complete, averages 5 ft. 6 in. in height and the superincumbent strata are allowed to fall and to fill up the space thus made. The experiments showed that the subsidence attained its maximum towards the centre of the excavated space, and that it gradually diminished in either direction. The wave of maximum subsidence regularly followed the working face and at an average distance behind it of 186 ft., this being equivalent to 1 ft. horizontal for every $3\frac{1}{2}$ ft. perpendicular. The country rock is generally of a firm nature, and the surface chiefly boulder clay. In describing, before the Manchester Geological Society, the section of a shaft sunk through the middle coal measures at Bardsley Colliery, Ashton-Under-Tyne, Mr. G. Wild mentions an interesting discovery of calamites, at a depth of 640 yards from the surface, the shoots of many of which were still attached to what, the author considers, were undoubtedly subterranean rhizomes.

A. Iwan describes in the *Oesterreichische Zeitschrift für Berg und Hüttenwesen* the Val de Travers Asphalt mine, Switzerland. The deposit occurs in the Lura formation between limestone and marl; it has a length of about 10 kilometres and a breadth of 2.5 kilometres. The annual production is about 60,000 tons. The bed has an East-West strike and dips to the South at an angle of from 1° to 3° ; it is 3 to 7 metres thick and is worked by ordinary post and stall, the pillars being left 4 metres thick.

F. Hartnigg describes in the same Journal the mining industries of the Upper Feistritz Valley, Styria, and of the neighboring districts. The chief rocks are gneiss and micaceous schist, and in these are found coal and ores of iron, lead, zinc and other metals. Limestone also occurs.

The Mining and Metallurgical Industries of Hungary have, of late, been attracting considerable attention both in Britain and on the Continent of Europe, and in a paper recently read before the Society of Arts, London, Mr. B. H. Brough gives a great deal of statistical information concerning these industries which he gathered during a visit to the Buda-Pesth Exhibition and to the mining districts of Hungary. He states that all mineral deposits of technical value are the property of the Crown, and that prospecting can only be undertaken with the permission of the Government mining authorities; a number of the more valuable mines are worked by the State. Mr. Brough describes the different deposits both geologically and historically, and remarking on the gold and silver mines of Schemnitz, he states that in 1690 they produced as much as 17,000 oz. of gold. The lodes occurring in the Schemnitz district proper are in biotite-trachyte. They course in a north-east, south-west direction parallel to one another and dip 45° to 80° towards east. They are filled with decomposed trachyte, quartz, or calc spar, containing auriferous silver

and lead ores, iron and copper sulphides and zinc blende. The dressing works at Schemnitz were constructed by Rittinger, and the most recent innovation is a second stamping of the ore; all that does not pass through a one-fifth inch mesh being automatically treated again. The Salzburg, or Lower Hungarian percussive table is found to be better than the Rittinger continuous percussive table, and although there are at the works three American iron stamps weighing 900 lbs. each, which do as much work as twelve continuous wooden ones, still these latter are on the whole considered more satisfactory. A great deal of statistical information relating to these mines is given by Mr. Brough. This is also the case in connection with the other mining districts of Hungary, and with regard to Transylvania he remarks that the oldest rock of this mining division is crystalline schist, above which is deposited mesozoic limestone and tertiary sandstone, through which burst various eruptive rocks which are traversed by gold veins, the gold being either free or associated with tellurium and sulphur. The largest quantity of gold is found where the rock is of average grain, and where the vertical main lodes intersect the veins with slight dip.

The tellurides from Nagyág are treated by boiling them with sulphuric acid pouring into water, allowing this solution to become clear and then precipitating the silver with hydrochloric acid, and, from the residual solution, the tellurium by zinc. In Transylvania stamps weighing 100 lbs. to 140 lbs. are used in the crushing of silver ores. The heads of stamps are of hard quartz blocks, and it is stated that the quartz answers tolerably well. The metallurgical industry of Hungary is also treated in the paper at some length.

Mr. P. L. Litchauer in an article in the *Berg und Hüttenmännische Zeitung* discusses various questions relating to the mining of the various Hungarian deposits of coal and of lignite. Coal, he says, occurs in Hungary in the carboniferous and Lias beds, lignite being found in the cretaceous and Tertiary rocks. The first colliery in Hungary was opened up in the year 1750, and the author describes at some length both the history of coal mining in Hungary and the laws connected with the subjects which have been, or are now in vogue there.

A translation from the Russian appears in the same Journal of a paper by N. Jossa, of St. Petersburg, on the reasons for the decline of mining and metallurgical industries in the Altaï Mountain District. He describes in detail the different deposit of ore and of coal, and gives statistical information relating to the production of gold, silver, copper, iron and lead during the years 1855-1884.

In the *Revista Minera or Metalurgica* appears a description by A. G. Espin of the mining industry of Portugal, and he describes the deposit of poor copper pyrites occurring at the Santo Domingo mine. This mine is situated at a distance of 14 kilometres from the Guadiana and about 50 from the sea. The ore deposit is of somewhat curious shape, and at its widest part has a width of about 60 metres, and a length of 600 metres. The ore averages about 2.75 per cent. of copper, though the percentage of this metal occasionally reaches 12. The present state and future prospects of the mining industry of Spain is discussed in the same paper by I. B. Vicens.

A series of articles on the mechanical principles of the modern stamp mill, by H. Louis has appeared in the *Mining Journal* and the subject is dealt with at considerable length.

BOOK NOTICES.

An English authority just to hand gives the following review of Mr. Griffith's 1886 edition of "The Iron and Steel Brand Book." "It is a valuable rather than interesting compilation. Nobody will think of turning over the pages of the book in search of amusement for an idle hour, and yet the work contains a vast amount of technical information for business men, handily arranged, and set forth in a manner that betrays no motive save a desire to produce a work of ready reference. Statistics of the output of iron and steel are excluded from Mr. Griffith's scheme, which aims at showing the kind and not the quantity, of the manufacture of iron now existent in Great Britain. A list is given of all the iron smelting works in England and Scotland whose iron is in the market. These amount to one hundred and sixty, and they contain seven hundred and seventy-one furnaces, of which one hundred and sixty have been standing idle since December, 1885. Charcoal iron is now produced by but one firm—located at Ulverston; and anthracite iron, since the stoppage of the Ynisdwyn Works, is represented only by the Ystalyfera Company of Swansea, which, however, also closed in December, 1885. Of cold blast iron there are now but twelve makers left, four in West Yorkshire, four in South Staffordshire, two in Shropshire, and one each in South Wales and North Lancashire. The hematite trade is represented by thirty-four firms, only ten of which combine the manufacture with that of other kinds of iron. Two hundred and twenty firms are included in the directory of mills and forges, sixty-five in that of steel converters, and thirty-three in that of steel rolling mills. For the record of brands, Mr. Griffith claims that though it does not set forth every description of iron, the headings are so comprehensive as to indicate the works likely to roll any section of iron that may be required. This of course, is a matter to be tested in practice, but of the general clearness of the arrangement and apparent completeness of the book there can be no doubt."

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MINING REGULATIONS

To Govern the Disposal of

Mineral Lands other than Coal Lands.

1886.

THESE REGULATIONS shall be applicable to all Dominion Lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, iron, or other mineral deposits of economic value, with the exception of coal.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein, either by surface or subterranean prospecting, for mineral deposits, with a view to obtaining under the Regulations a mining location for the same, but no mining location or mining claim shall be granted until the discovery of the vein, lode, or deposit of mineral or metal within the limits of the location or claim.

QUARTZ MINING.

A location for mining, except for iron, on veins, lodes, or ledges of quartz or other rock in place, shall not exceed forty acres in area. Its length shall not be more than three times its breadth, and its surface boundary shall be four straight lines, the opposite sides of which shall be parallel, except where prior locations would prevent, in which case it may be of such a shape as may be approved of by the Superintendent of Mines.

Any person having discovered a mineral deposit may obtain a mining location therefor, in the manner set forth in the Regulations which provide for the character of the survey and the marks necessary to designate the location on the ground.

When the location has been marked conformably to the requirements of the Regulations, the claimant shall, within sixty days thereafter, file with the local agent in the Dominion Lands Office for the district in which the location is situated, a declaration or oath setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as aforesaid; and shall, along with such declaration, pay to the said agent an entry fee of FIVE DOLLARS. The agent's receipt for such fee will be the claimant's authority to enter into possession of the location applied for.

At any time before the expiration of FIVE years from the date of his obtaining the agent's receipt, it shall be open to the claimant to purchase the location on filing with the local agent proof that he has expended not less than FIVE HUNDRED DOLLARS in actual mining operation on the same; but the claimant is required before the expiration of each of the five years, to prove that he has performed not less than ONE HUNDRED DOLLARS' worth of labour during the year in the actual development of his claim, and at the same time obtain a renewal of his location receipt, for which he is required to pay a fee of FIVE DOLLARS.

The price to be paid for a mining location shall be at the rate of FIVE DOLLARS PER ACRE, cash, and the sum of FIFTY DOLLARS extra for the survey of same.

Not more than one mining location shall be granted to any individual claimant upon the same lode or vein.

IRON—The Minister of the Interior may grant a location for the mining of iron, not exceeding 160 acres in area, which shall be bounded by north and south and east and west lines astronomically, and its breadth shall equal its length. Provided, that should any person making an application purporting to be for the purpose of mining iron thus obtain, whether in good faith or fraudulently, possession of a valuable mineral deposit other than iron, his right in such deposit shall be restricted to the area prescribed by the Regulations for other minerals, and the rest of the location shall revert to the Crown for such disposition as the Minister may direct.

The Regulations also provide for the manner in which land may be acquired for milling purposes, reduction works, or other works incidental to mining operations.

Locations taken up prior to this date may, until the 1st August, 1886, be re-marked and re-entered in conformity with the Regulations without payment of new fees, in cases where no existing interests would thereby be prejudicially affected.

PLACER MINING.

The Regulations laid down in respect of quartz mining shall be applicable to placer mining as far as they relate to entries, entry fees, assignments, marking of localities, agents' receipts, and generally where they can be applied.

The nature and size of placer mining claims are provided for in the Regulations, including bar, dry, bench, creek or hill diggings, and the RIGHTS AND DUTIES OF MINERS are fully set forth.

The Regulations apply also to

BED-ROCK FLUMES, DRAINAGE OF MINES, AND DITCHES.

The GENERAL PROVISIONS of the Regulations include the interpretation of expressions used therein; how disputes shall be heard and adjudicated upon; under what circumstances miners shall be entitled to absent themselves from their locations or diggings, &c., &c.

THE SCHEDULE OF MINING REGULATIONS

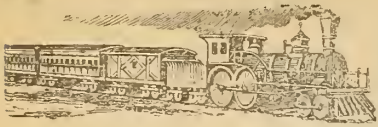
Contain the forms to be observed in the drawing up of all documents, such as:—"Application and affidavit of discoverer of quartz mine." "Receipt for fee paid by applicant for mining location." "Receipt for fee on extension of time for purchase of a mining location." "Patent of a mining location." "Certificate of the assignment of a mining location." "Application for grant for placer mining and affidavit of applicant." "Grant for placer mining." "Certificate of the assignment of a placer mining claim." "Grant to a bed-rock flume Company." "Grant for drainage." "Grant of right to divert water and construct ditches."

Since the publication, in 1884, of the Mining Regulation to govern the disposal of Dominion Mineral Lands, the same have been carefully and thoroughly revised with a view to ensure ample protection to the public interests and at the same time to encourage the prospector and miner in order that the mineral resources may be made valuable by development.

COPIES OF THE REGULATIONS MAY BE OBTAINED UPON APPLICATION TO THE DEPARTMENT OF THE INTERIOR.

A. M. BURGESS,

Deputy Minister of the Interior.



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DEPARTMENT OF INLAND REVENUE.

AN ACT RESPECTING AGRICULTURAL FERTILIZERS.

THE public is hereby notified that the provisions of the Act respecting AGRICULTURAL FERTILIZERS came into force on the 1ST of JANUARY, 1886, and that all Fertilizers sold thereafter require to be sold subject to the conditions and restrictions therein contained—the main features of which are as follows:—

The expression "fertilizer" means and includes all fertilizers which are sold at more than TEN DOLLARS per ton, and which contain ammonia or its equivalent of nitrogen, or phosphoric acid.

Every manufacturer or importer of fertilizers for sale, shall, in the course of the month of January in each year and before offering the said fertilizer for sale, transmit to the Minister of Inland Revenue, carriage paid, a sealed glass jar, containing at least two pounds of the fertilizer manufactured or imported by him, with the certificate of analysis of the same, together with an affidavit setting forth that such jar contains a fair average sample of the fertilizer manufactured or imported by him; and such sample shall be preserved by the Minister of Inland Revenue for the purpose of comparison with any sample of fertilizer which is obtained in the course of the twelve months then next ensuing from such manufacturer or importer, and which is transmitted to the chief analyst for analysis.

If the fertilizer is put up in packages, every such package intended for sale or distribution within Canada shall have the manufacturer's certificate of analysis placed upon or securely attached to each package by the manufacturer; if the fertilizer is in bags, it shall be distinctly stamped or printed upon each bag; if it is in barrels, it shall be either branded, stamped or printed upon the head of each barrel, or distinctly printed upon good paper and securely pasted upon the head of each barrel, or upon a tag securely attached to the head of each barrel; if it is in bulk, the manufacturer's certificate shall be produced and a copy given to each purchaser.

No fertilizer shall be sold or offered or exposed for sale unless a certificate of analysis and a sample of the same shall have been transmitted to the Minister of Inland Revenue, and the provisions of the foregoing sub-section have been complied with.

Every person who sells, or offers or exposes for sale, any fertilizer, in respect of which the provisions of this Act have not been complied with,—or who permits a certificate of analysis to be attached to any package, bag or barrel of such fertilizer, or to be produced to the inspector, to accompany the bill of inspection of such inspector, stating that the fertilizer contains a larger percentage of the constituents mentioned in sub-section No. 11 of the Act than is contained therein,—or who sells, offers or exposes for sale any fertilizer purporting to have been inspected and which does not contain the percentage of constituents mentioned in the next preceding section,—or who sells or offers or exposes for sale any fertilizer which does not contain the percentage of constituents mentioned in the manufacturer's certificate accompanying the same, shall be liable in each case to a penalty not exceeding fifty dollars for the first offence, and for each subsequent offence to a penalty not exceeding one hundred dollars: Provided always, that deficiency of one per centum of the ammonia or its equivalent of nitrogen, or of the phosphoric acid, claimed to be contained, shall not be considered as evidence of fraudulent intent.

The Act passed in the forty-seventh year of Her Majesty's reign, chaptered thirty-seven and intituled "an Act to prevent fraud in the manufacture and sale of agricultural fertilizers," is by this Act repealed, except in regard to any offence committed against it or any prosecution or other act commenced and not concluded or completed, and any payment of money due in respect of any provision thereof.

A copy of the Act may be obtained upon application to the Department of Inland Revenue.

E. MIALL,

Commissioner.



Tenders for a License to Cut Timber on Dominion Lands in the Province of British Columbia.

SEALED TENDERS addressed to the undersigned and marked "Tender for a Timber Berth," will be received at this Office until noon on Monday, the 1st day of November next, for four timber berths of ten square miles each, more or less, numbered respectively 4, 5, 8 and 9, situated on Kicking Horse River, and Otter Tail Creek, a tributary of the Kicking Horse River, near Field and Otter Tail Stations, on the line of the Canadian Pacific Railway, in the Province of British Columbia.

Sketches showing the position, approximately, of these berths, together with the conditions on which they will be licensed, may be obtained at this Department or at the Crown Timber Offices, Winnipeg, Calgary, N.W.T., and New Westminster, British Columbia.

A. M. BURGESS,
Deputy of the
Minister of the Interior.
Ottawa, 14th August, 1886.



Tenders for a License to Cut Timber on Dominion Lands in the Province of British Columbia.

SEALED TENDERS addressed to the undersigned and marked "Tender for a Timber Berth," will be received at this Office up to noon on Wednesday, the 1st day of December next, for three timber berths of fifty square miles each, more or less, numbered respectively 16, 17 and 18, situated on the west side of the Columbia River, near Golden City Station, on the line of the Canadian Pacific Railway, in the Province of British Columbia.

Sketches showing the position, approximately, of these berths, together with the conditions upon which they will be licensed, and the forms of tender therefor, may be obtained at this Department or at the Crown Timber Offices at Winnipeg, Calgary, N.W.T., and New Westminster, British Columbia.

A. M. BURGESS,
Deputy of the
Minister of the Interior.
Department of the Interior,
Ottawa, 9th September, 1886.

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Correspondence with Owners of Mines and Capitalists desirous of investing is most respectfully solicited.

Address all Communications to

E. G. POWELL, Union Chambers, 14 Metcalfe Street, Ottawa, Canada

CANADIAN MINING REVIEW

VOL. 4.—No. 7.

1886—OTTAWA, OCTOBER—1886

VOL. 4.—No. 7

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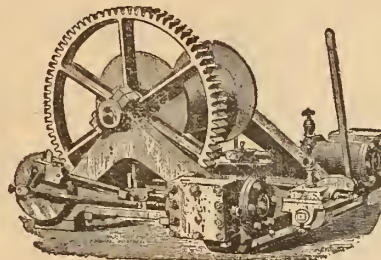
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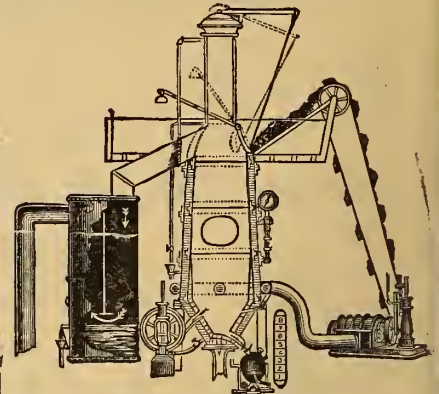
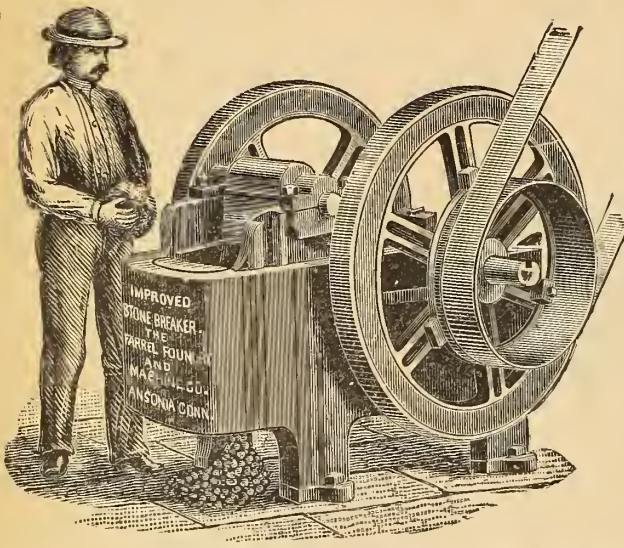
MR. S. L. MARSDEN, who for the past twenty years has been connected with the manufacture of the "Blakes Crusher," New Haven, superintends the construction of this machine. Awarded GOLD MEDAL at the Massachusetts Mechanics' Association, 1881, and SILVER MEDAL (special) American Institute, 1882.

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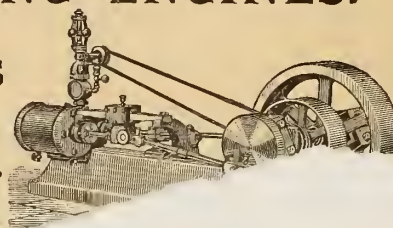
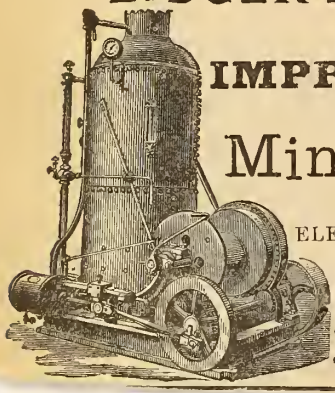
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OTTAWA.

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O'FICE:

UNION CHAMBERS, 14 Metcalfe Street.

The CANADIAN MINING REVIEW is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts as well as others interested in Canadian Mineral Lands are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 20th of the month.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

The death is announced of Mr. John Kelly, Deputy Commissioner of Mines for the Province of Nova Scotia. The late gentleman who was much respected has occupied this position for nearly a quarter of a century. Mr. Charles Carman, the deceased deputy's chief clerk, is highly spoken of as his probable successor.

At the annual meeting of the Iron and Steel Institute held in London on the 6th inst., President Piercy, the retiring officer, delivered an address on the iron and steel resources of Great Britain and the United States, and pointed out that British production of Bessemer Steel is rapidly decreasing.

We have observed with much satisfaction signs of improved methods being adopted for the development of our mining industry. During the past year substantial progress has been made. Our iron, copper, silver, gold, apatite, asbestos and salt deposits present a field for enterprise which has been too long neglected; and with the union of capital and skill we may confidently hope for the development of these resources, which, in the near future, will form not an unimportant part in advancing the welfare of the country.

At a great demonstration of miners held recently in the west of Scotland, a resolution was submitted regretting the continuance of low prices and consequent low wages; the evasions of the Truck Act, so common in the country, were strongly denounced and energetic measures to suppress the evil were called for. The reso-

lution also sought for the establishment by law of an eight hours day for underground workers. There was a considerable degree of earnestness and enthusiasm shown by the men, and the various speakers were warmly cheered when they referred to the hardships of the miners' lot and indicated the means by which it might be improved.

Nothing, remarks our esteemed contemporary the *Engineering and Mining Journal*, is more surprising than the tonic and strengthening effect of salt water or even a sea breeze on a gold or silver mine. A poor puny prospect-hole out west has only to cross the Atlantic once, and by the time it reaches London it is a "strong" and "healthy" lode, 'mineralized throughout,' full of "great strikes," and stronger and richer the deeper it is followed. From the merest shadow of a mine that would not yield "grub" to the industrious and abstemious Western miner, the sea air has invigorated it to such an extent that it not only can pay the liberal board of distinguished "guinea-pigs," but it promises a profit of from 20 to 50 per cent. on several million dollars of the worthy investors. We have not noticed that any physico-mineralogico-medical authorities have heretofore called attention to this curious and important phenomenon.

We continue to experience much difficulty in collecting correct statistics and other reliable facts in connection with mining operations in the Dominion; not that the information has been refused us in any case, but owing to the nature of it the owners and managers of mines neglect to furnish us with the particulars we desire. They appreciate the value of publishing reports of the mining industry, and wherever personal visits have been made they have been found willing to give details relating to the progress made, number and wages of employees, quantity and value of output, &c., &c. But while a personal visit to the various mines is desirable—and for gaining a proper knowledge of the industry, local observation and enquiry are occasionally essential—it is an expensive mode of ascertaining facts, and the great distances to be travelled in order to make a complete round of the mining centres of the Dominion would necessitate our employing a staff of representatives which we could not support. The progress of our mining industries is a subject in which the country at large has a deep interest, and the time has arrived when it has become necessary to organise a Bureau of Mines, in connection with the Geological Survey, with authority to make the supply of information compulsory.

Mining in Ontario is certainly growing in importance, though much more slowly than the extent and richness of her mineral deposits would warrant. Mr. A. Blue, Secretary of the Bureau of Industries, in his annual report to the Commissioner of Agriculture, declares that throughout the mining districts of the province,

as in the United States, speculation has been far more active than business enterprise, and adds: "It is easier to place a mine in the market for a million dollars than to sell it for a hundred thousand." The methods adopted for working mines have been, on a small scale, precisely the same as those pursued in the United States, on a large scale. The money required for prosecuting mining operations has been ventured in the hope of realising a speedy fortune from the discovery of a bonanza; operations are marked by rashness and extravagance, and too often end in disappointment and failure. In other words, plans are seldom laid with a view to the remote future, the desire being to produce the largest amount of bullion in the shortest time possible. The same experience is referred to by Mr. Clarence King, in the United States Census Report, recently issued. He says, after referring to the stability and steadiness of the mining industry in some foreign countries, "an engineer in this country is hardly to be blamed if he plans for the immediate present; on the one side he is pressed by the stockholders, clamorous for speedy profits, and on the other hand he realizes that the chances for a long period of bonanza are slight. His policy is forced upon him. He aims to secure given results by the most direct means, and when the object has been attained he cares little whether his drifts cave, and the structures over his hoisting works and mills fall in, if they have served their purpose." This, says Mr. Blue, is the record of Silver Islet, and East Silver Mountain, in the Province of Ontario, one of which has yielded millions of ore, and the other nothing beyond a rich surface show.

Insoluble Phosphate.

The following letter has been recently addressed to a gentleman in the Southern States by N. B. Powter, Esq., manager in New York of the Grand Cayman's Phosphate Co., of Kingston, Jamaica, W. I.:

MY DEAR SIR,—

You ask "why does the insoluble phosphoric acid in the natural West Indian Guanos give good results when sown with potash and ammonia, when the insoluble phosphoric acid in Charlestown floats, Canadian apatite, navassa and other rocks give no results although applied in a much finer state of division than the West Indian Guanos?"

In reply, allow me to state that the solubility of the phosphoric acid depends on two great points.

First: The amount of volcanic heat to which they have been subjected. For instance, apatite is the most insoluble of all forms of phosphate rock, and the most perfectly crystalized by volcanic heat. Then, next, those rocks which have been only partially crystalized, such as Charlestown rock, Navassa, Connetable, Swan Islands, phosphate of alumina from Germany, France, and Spain, and many others. But the natural fertilizers from the low lying islands, which all show that they are water formations and have never been subjected to any heat are very few in number and of small extent, and most of them so low in grade as not to pay to mine and ship.

Those best known here are Orchilla, Mona, Flamingo, Vivorilla (exhausted), Cay Avola (exhausted), Morant cays (exhausted), and now we offer the Grand Cayman's phosphatic guano, only recently discovered and of large extent. And this last is the only natural guano which is a compound of phosphate of lime, phosphate of alumina, and phosphate of iron, and these ingredients add much to its value as they help more on soils where the simple carbonaceous guanos have but little effect, such as marls and limes.

Secondly: The natural guanos are themselves soils which have been acted upon through a great length of time by the air, water, and action of vegetation. The mechanical condition is thus naturally suited to plant life, whereas the crystallized rocks before mentioned are often in great masses, as in connetable, the apatites, &c., &c. or are covered up in beds and pockets as in the Charlestown beds, Navassa, &c., &c., and are entirely useless in their present state for plant food.

Hence, although all are classed as insoluble phosphates by the chemists because they will not dissolve in water. Yet the natural guanos are all more or less soluble in citrate of ammonia solutions, and are fit for plant food as much so as the reverted phosphoric acid which is in the acid phosphates made from Charlestown rock, apatite, &c., &c.

Such being the case, I warn you not to be led astray by the statement that the insoluble phosphoric acid in Charlestown floats is as good as the natural guanos, for it has been proved over and over again that floats from Charlestown rock, apatite and navassa give no results, and as proved by the Georgia State experiments often make an actual loss.

I am, yours truly,
(Signed), N. B. POWTER.

[We publish the foregoing letter with the permission of its author, in order that our readers may have an opportunity to criticise in these columns the statements Mr. Powter makes. We have not the slightest doubt that he implicitly believes all the theories he advances, and in the interest of the Company he represents it is well that he should; on the other hand we have had the most positive assurance that experiments which from time to time have been made with Canadian apatite in its raw state have proved it to be very useful as a plant food the second year, and frequently the first year, after application. —ED.]

The Phosphate Trade.

The first shipment of Canadian phosphate went forward from Montreal on May 12th consigned to Hamburg, and since that date shipments have been irregular, due chiefly to the unsettled state of the British and European fertilizer markets, and the unusual fluctuations in ocean freight rates which have varied from five to twelve shillings per ton, and at this last high rate some of the later lots have gone forward. The market abroad has been in a stagnant condition during the past nine months and values have been reduced to 11d. per unit. for 80 per cent. phosphate, and with ocean freight at 8 to 12 shillings it is not to be wondered at that mine owners look upon the season's business with dissatisfaction. Notwithstanding this unfavorable state of things, viz.: reduced values and higher freights, there has been a fair amount of business done, which, however, must have proved

unremunerative to sellers.

Mine owners continue confident that there will be an early revival in the fertilizer trade and that better prices will be realized next season. This opinion is endorsed by dealers on the other side who report that indications of a re-action are already noticeable and predict an active market with the opening of navigation of 1887. Some of the producers have been averse to forwarding their output under the unfavourable conditions which have characterized the season's operations, and those of them who can afford to carry over until next year are wise if they have done so.

There has been no apparent relaxation in the activity at the mines; on the contrary, work has been carried on energetically throughout the past summer, and preparations are being made for continuous active operation during the winter.

The DuLievre Phosphate Milling Company have been much encouraged by the flattering letters they have received from customers, attesting to the excellent quality of their ground phosphate which they have received and used during this season. Shipments aggregating about 600 tons have been made to Boston, Buffalo, Detroit, Chicago and St. Catherine, and in every instance consigners have expressed themselves highly pleased, and affirm that they can use this grade of fertilizer to better advantage and with more satisfactory result than they have been able to obtain from South Carolina rock which they have been in the habit of using.

The demand for this ground phosphate will certainly expand, as there is every reason to believe that a large percentage of each year's production will be sold in this form, and that its principal market will be the northern United States. When such a market has been established it will very materially stimulate the Canadian phosphate mining industry.

We are not yet in receipt of a statement of phosphate shipments to date, but there is no doubt that the quantity which has gone forward for the season is considerably less than last year. Before our next issue will appear, the shipping season will have closed, and the November number of the REVIEW will contain a detailed statement of the year's output, and of all shipments for the season of 1886.

Asbestos Mining in Canada.

This industry is rapidly expanding in the Eastern Townships, and with the assistance of capital, and skilled labor it will assume larger proportions year by year. During the season of 1886, up to date, there has been greater activity noticeable at the mines than in any former year, and the result has been a marked increase in the production. The market, too, has been fairly brisk, and the demand abroad for Canadian asbestos is steadily increasing, as we find it to be superseding the Italian almost entirely.

Values have been steady during the year, and remain so, prices ranging from \$80 to \$50 per ton (2,000 lbs.), according to quality. A portion of this season's output is yet unsold although some of the most extensive operators have orders ahead for all they can produce up to the end of the year at current prices.

The Anglo-Canadian Asbestos Company (limited), are getting their mine at Black Lake well opened up, and will soon be in a position to largely increase their output. The steam drills, and air compressors which they put in last winter have given great satisfaction, and will ultimately tend to greatly facilitate mining operations.

The Scottish-Canadian Company, whose mine

is also situated at Black Lake, are preparing to put in machinery with a view to increasing their operation which are now under the superintendence of Mr. Chas. Lionais.

The Thetford mines, which are worked to a greater depth than has yet been reached at Black Lake, are still operated entirely by hand labor. In consequence of the greater depth from which the asbestos is taken at the mines in Thetford, the output is more uniform in color than that of the other mines of the district whose surface output requires to be classified as 1st and 2nd quality. The Black Lake mines are looked upon with much favor for future, and more extensive working, and when greater depth has been reached their product will unquestionably be of the highest grade. New uses for asbestos are being constantly discovered, but it is difficult to obtain accurate information in this connection until such discoveries have been worked out, and perfected, and but a small percentage of them prove of any practical value.

The output of the Canadian asbestos mines for this year, up to date, will aggregate about 2,000 tons, 500 tons in excess of last year's production for the entire season, and is made up approximately as follows:

	Tons.
Anglo-Canadian Company, Black Lake	400
Scottish-Canadian Company, "	200
Boston Asbestos Packing Company, Thitford	400
Johnson Company, Thitford	375
King Bros. & Company, Thitford	175
Ward & Company, Thitford	150
Jeffery & Company, Danville	200
Desultory mining, say	100
Total, ...	2,000

Coal in New Zealand.

In a recent report presented to the New Zealand House of Representatives by Mr. Larnach, the Minister for Mines, it is stated that in 1878 the total output was only 162,218 tons, but in 1884 it had reached 484,831 tons, and last year 511,063 tons. The consumption of the colony is still, however, in excess of the home production, and in 1885 130,202 tons were imported. The number of workings at present in operation in New Zealand is 95, and the output per man 345 tons per annum. Last year there was a strike at one of the mines, which resulted in a loss of production of 36,000 tons. In two cases the shafts reach a depth of 1,600 feet, and at that point the seam is from 17 feet to 18 feet in thickness. The industry is being conducted with a good deal of energy and enterprise, the best machinery being used, and it is hoped that before long the export of coal from New Zealand to the other Australasian colonies will assume some importance. It is acknowledged, however, that for a long time to come agricultural and pastoral industry will naturally claim priority in the application of capital and labour to the natural resources of the country.

The recent inquiries into the dangers of blasting have served to stimulate invention in the direction of mechanical "coal-getters." Several promising devices have lately been brought to notice of colliery owners in England and on the continent. Some of these are now undergoing the test of actual work. In the Westphalian mines particularly, attention is given to such machines, two or three of which have already won their way into favour. Foremost among these is that of Herr von Walcher. This apparatus, says Mr. George G. Andre, in the *Colliery Guardian*, is in regular use in three important collieries, from each of which have been received a highly satisfactory report of its working.

COPPER IN ONTARIO.

Extensive Deposits Near Sudbury.

DEVELOPMENT WORK BEING VIGOROUSLY PUSHED
WITH MOST SATISFACTORY RESULTS.

So much has been written within the past few weeks in the *press* regarding the copper deposits in the vicinity of Sudbury, and the reports have varied so vastly as to facts, that we will endeavour now to give our readers the benefit of the information we have been able to gather from other reliable sources as well as from a representative of the *Review* who has quite recently visited the locality in question with a view to arriving, as nearly as possible, at the facts as they actually exist.

The main lode, carrying yellow Sulphuret of Copper ore, has been traced by surface croppings for a distance of about four miles and extends from lot 5 in the 1st concession of the Township of Blezard, known as Stobie, or Mineral Hill location, south-westward to lot 2, in the 12th concession of McKim, known as Copper Cliff location. Another lode appears on the lot 11, in the 5th concession of McKim, about five miles from Sudbury, where it is crossed by the main line of the Canadian Pacific Railway.

THE FIRST DISCOVERY OF COPPER

in the district, according to a report by Mr. Blue, Secretary of the Ontario Bureau of Industries, was made at this point at the time of the construction of the railway. The deposit extends south-ward and east-ward until it joins the main lode of Copper Cliff, and on it are the McConnel and Fly Lake locations. Some prospecting has been done on these properties, but the only actual development work has been at Copper Cliff.

Mineral Hill location, about four miles north-east of Sudbury, was discovered and taken up by Mr. W. Stobie, in August, 1885. Here an opening has been made on the lode from the foot to the top of the hill on its south-east side and a test pit sunk to sufficient depth to reveal good ore. Proceeding south-westward, for a half mile or so, the Exposed Hill's location is reached, on lots 6 and 7 in the 6th concession of McKim, which comprises eight hills, extending along the north-west side of the north branch of Sudbury Creek, and embracing 6,500 feet on the lode. From both the Exposed Hills and Mineral Hill claims a fair quantity of ore has been taken out, and the assays have been very satisfactory. A line of railway has been surveyed for the main line of the Canadian Pacific Railway which will serve both these locations.

The Murray location, the property of Thomas Murray, M.P.P., of Pembroke, is crossed by the railway and shows out croppings of ore along its whole extent. Nothing has yet been done towards developing this claim, although this portion of the lode is regarded as very rich in copper.

On the McConnel location, which is on the same ridge as the Murray, two test pits have been sunk, penetrating bodies of high grade ore. To the eastward of the McConnel claim, two pits have been sunk on the Fly Lake location, lot 1, concession 3, of Snider township, the result of which has been to expose a sufficiently important ore body to induce the Canada Copper Company to pay \$13,000 for the entire claim, comprising about 1,800 acres.

THE CANADA COPPER COMPANY

is composed of wealthy United States and Canadian capitalists, and has been organized by Mr. Ritchie, of Akron, Ohio, President of the Central Ontario Railway. This company has already acquired the Copper Cliff, Fly Lake, McConnel, Mineral Hill, and one of the Exposed Hills locations, and will vigorously prosecute mining operations as soon as transportation facilities have been arranged by the construction of branch lines of railway. Already five locations on the main lode have been partially developed, one of which, the Copper Cliff, is now being extensively worked by the Canada Copper Company by means of open quarry work, which has been driven forty feet into the face of the hill, at a point where the vein is about fifty feet wide. About one hundred men are now employed, and owing to the very favourable position of the deposit at this point the ore can be raised at small cost, and in large quantity. Quite 2,000 tons of ore are now on the dump awaiting shipment, and the company is forwarding about 15 car loads daily to the smelting works in New Jersey. It is thought that ultimately the output of copper ore from this locality will find its way to Cleveland, and Detroit, as the reduction in freight rates to those points would be an important item. The distance by rail to Lake Huron is but 70 miles, from whence it can be shipped in ore vessels direct to the smelters. It is not unlikely that furnaces will eventually be erected in proximity to the mines, and the ore smelted there, and in the interest of the industry it is very important that some determined step should be taken in this direction.

The mineralized portion of the main lode in the Sudbury district is composed of yellow Sulphuret of Copper, (copper pyrites) intersected by strings of galena, and at some points measure from 40 to 60 feet in width of high grade of ore which will probably yield 8 to 15 per cent. of Metallic copper. Although these figures are infinitely below those which have been published, anyone familiar with the history of the important copper mines in other parts of the world will readily agree with us in the opinion that if the above data can be relied upon as the average character of the Sudbury lode, it will develop into a mine, or a number of mines, of gigantic proportions and unlimited capabilities.

Revival of the Mining Industry.

We are indebted to the *Engineering and Mining Journal* of the 2nd for the following:—"The great revival in business that has fairly taken root in this country has a more healthy tone and better prospect for enduring than the spurt we had a year ago. At that time, as we pointed out, every branch of business was lifeless throughout Europe, and so closely connected are countries to-day that no one can long enjoy great prosperity while the others are suffering from business stagnation. Our present active business is accompanied with a decided improvement and a better outlook in every European country. There is, consequently, good ground for the belief that we have fully entered upon a great wave of universal prosperity that will carry us forward for a few years at least.

We are not admirers of 'booming,' and we hope the present business activity may continue to increase at such an even and temperate rate that the wild excitement and violent fluctuations that are the symptoms of 'booming' may not be seen. A more active interest in mining and a greater desire to invest in mineral property have been very noticeable for some time past. We

are also advised from London that a real 'boom' has come over phlegmatic cousin John, and nothing is talked of but the great gold strike in the Transvaal, South Africa. It is said that the mine produces large amounts of seven-ounce rock. If this be so, it will go hard with the Boers to hold their country, and whatever the rest of the world may gain, they will probably lose.

But as 'one swallow does not make a summer,' so one find of seven-ounce ore does not create a rich mining country, though it is sufficient to excite the average London mining broker. The example of the Indian gold mines, in which so many millions have been sunk on the fortunate accident of finding one, but only one paying mine, the Mysore, among the vast number of prospects sold at the prices of good mines, makes it probable that a fresh lot of good money will go out from that great paradise of worthless mine vendors. It is safe to predict its principal return will again be the valuable but unheeded experience that prospects are not mines; that an investment in the shadow of a neighboring bonanza is the most unsubstantial of values; that the prospectuses prepared by London 'promoters' are generally works of pure imagination and financial will o' the wisps; and that no public mining investment is worthy of attention unless the value of the property has been ascertained and is vouched for in detail by competent, disinterested and honest experts.

But it is not our province to warn Englishmen of the shoals and quicksands that surround Indian and African mining speculations. Nor is it possible for us to buoy every sunken reef that will wreck so many English investments in this country. For some time past, American mines have found ready sale in London, and for the most part, those offering there are either absolutely worthless, as in several cases we have exposed, or are so vastly overvalued as to be little short of swindles.

It is the old story over again: 'It is all but impossible to sell a mine in London at a fair and honest value.' And American mines are brought into disrepute by the dishonesty of those who float worthless property there, and the unquestioning credulity of those who invest on their 'fish-stories.'

Mining never was more prosperous in this country than it is to-day, and there is no other kind of investment that offers so large a reward as that prudently made in mineral property, neither is there any other country in the world that has so many good mines or offers so many of the elements of success and profit to the investor.

Products of Bituminous Coal.

"Few persons, says the *Chicago Mining Review*, have an idea of the wonderful products from a lump of coal—a lump of coal that is placed in the retort of a gas manufactory. Ordinarily burned, the combustion of a lump of coal results in carbonic acid smoke (which is merely soot, or rather the visible portion of smoke is soot), and the ash, in which are found silica, alumina, oxide of iron, phosphoric acid, sulphuric acid, potash, sodium, combined sulphur, sometimes traces of chlorine, titanate acid and other substances. In the gas retort a variety of products are obtained. The gas as it is carried through the hydraulic main to the purifying rooms takes with it tar and ammonia, the latter evolved from the nitrogen. Ammonia has to be washed out with water in an arrangement by which the ammonia is gathered and saved. Tons and tons of sulphate of ammonia are thus made and become an

article of commerce. The sulphur is removed by caustic lime or oxide of iron. The carbonic acid is also removed by lime, but the carbonic acid cannot be removed, and with several others remain in the gas after all efforts to remove it. The others give the gas its smell.

By distillation naphtha and asphaltum are obtained. Asphaltum is a dead oil, very useful to preserve wood. From this, too, carbolic acid is obtained, very important in surgical operations as being the most valuable antiseptic known. From naphtha, benzole, eumol, teluol and cymol are obtained. Naphtha, as is well known, is used as a burning fluid. Benzole is a solvent for grease and oils, very useful in cleaning kid gloves and things of that kind.

Benzole treated with nitric acid produces nitro-benzole. This singularly enough, is used as a flavoring extract by confectioners and for perfuming soap. When used for this purpose it is known in commerce as the essence of myrrhbane, which it is not, although it smells and tastes something like essence of myrrhbane or oil of bitter almonds. Nitro-benzole is terribly poisonous but not more so than some other adulterants used by confectioners.

From nitro-benzole analine is obtained. This when first obtained is a perfect colorless liquid but darkens as it grows older. From analine are obtained the coal-tar colors, which are so very brilliant. The colors are of all hues. The one known as 'turkey-red' is exactly similar to the red that used to be made from the madder root. Since the discovery of this analine it has almost completely broken up the raising of madder in Holland. There, thousands of acres were devoted to the raising of madder root to get the turkey-red dye. It can be made much cheaper from the product of a gas factory."

Henry George on Miners.

In the *North American Review* for September Mr. Henry George, the well known author of "Progress and poverty," and other politico-economic works, makes some startling revelations of the condition of labor in Pennsylvania. His investigations have been mainly among the mining class, which numbers many thousands of men, most of them with families depending upon them. Mr. George, before going into details, calls attention to the extraordinary natural advantages of that great state. It is nearly as large as England, and in the fertility of its soil its mineral wealth and commercial position stands second to no state in the world. It has a fine population of four millions and a half, a mere fraction of what so rich a state is capable of maintaining. If anywhere in the world, labor should there enjoy the greatest rewards. Poverty and pauper wages should be things unknown. But mark the actual state of affairs among the mining class. Pennsylvania is the greatest coal-producing state of the union. She has almost a monopoly of it, especially in the article of anthracite. She has enjoyed (to use a phrase that is becoming ironical) the most stringent protection. And yet her miners are to-day in a condition the most pitiable imaginable. They are the abject, helpless slaves of the great coal kings, men who own whole counties and against whom the power of labor unions is exerted in vain. Mr. George cites the case of a mining strike among the workmen of one of these anthracite magnates who, refusing to listen to the men's complaints, swore he would burst the strike or turn the country into a desert. As he was the owner of whole mining townships and could apply the screw of eviction even more remorselessly than an Irish landlord, it is needless to say that he burst the strike.

The tenements supplied by the great coal men to their workmen are pictures of squalid wretchedness. Workmen have no chance to become property owners themselves because the coal proprietors will not sell, and even if they would the workmen can never save money. Protectionist quotations of their high wages are entirely fictitious. The wages the miners are supposed to receive are in point of fact about double what they actually get. For out of his wages the wretched coal miner has to pay for his own explosive, for the sharpening of his tools, and for the coal he consumes. In England, coal owners have to bear these expenses themselves. Then, too, in Pennsylvania, a system prevails of deducting from the men's pay for impurities in the coal which has become a most tyrannical abuse. Each man has a car with his number attached, and as the car is drawn from the pit it is examined. The smallest piece of shale or the slightest shortage in weight damns the whole load. The miner gets nothing for it and the coal owner gets a car-load without costing him a cent.

The most flagrant abuse of all is the system of company stores. The coal owners maintain establishments for supplying the general wants of the miners, which, from their extortionate nature, the miners have dubbed "pluck me" stores. Prices in these establishments range from 15 to 100 per cent. higher than elsewhere, but the miner is powerless. He must deal at the "pluck me" store on pain of losing his occupation. He seldom sees a cent of his wages. Only the difference between his account at the store and his wages ever comes to him, and oftener than not his account is greater than his wages after the latter have been subjected to the deductions mentioned before.

To fight the coal owners is almost impossible. Legislation could help the miner, but legislation is controlled by the giant monopolists. The latter are all powerful. Sheltered behind the protection screen, they fear no competition. They control the market for their coals, but the only commodity the miner has to sell, his own labor, is left defenceless. On the slightest provocation, indeed without any provocation whatever, Bohemians and Hungarians are introduced to work the mines at wages upon which the Americans cannot exist. In England, where wages are in reality but little lower than in Pennsylvania, and where money goes a great deal further, no one hears of the importation of Bohemian and Hungarian miners. The reason is that in Free Trade in England it is more profitable to employ the best men that can be got, and the English miner is doubly as good a workman as the half-starved Bohemians and Hungarians. In Pennsylvania the coal monopolists are under no necessity of employing the best men. They are sure of their market and consequently are sublimely indifferent to the class of workmen they employ. Protection is bearing its bitter fruit in Pennsylvania.

Deep Shafts of the World.

Western miners have in ten years accomplished nearly as much as has been done in Europe in three centuries. At least such would be the inference when a comparison is made between the deepest workings of the old and new world. The deepest shaft in Europe is the Adelbert, at Prizbam, Bohemia, which was started in the sixteenth century, and has a depth of 3,280 feet. The greatest depth obtained by a shaft on the American continent, is the Combination shaft, on the Comstock, which was begun ten years ago and is within thirty-seven feet of being as deep as the famous ancient hole on the other side of the waters.

Mining in Australia.

"PENDRAGON" AT BALLARAT, AND HIS DESCRIPTION OF THE WORK AT THE FAMOUS BAND AND ALBION GOLD MINES.

The following letter by the gentleman who edits the "*Referee*," under the well known *nom de plume* of *Pendragon*, and who is now travelling in Australia for the benefit of his health, is so interesting that we reproduce it for our readers in full.

"When we went to see the Arts and Sciences Exhibition at Melbourne the sight which 'took' my companions far and away above pictures or sculpture or designs or models or anything of that sort, was a case which contained gilt casts of the most celebrated nuggets found in Victoria. About this they hung and hovered. I went two or three times round the show, and always found them in the same place, examining the nuggets, reading how one or other of the most weighty among them had been come upon suddenly and without any premeditation, how another had been found within a few feet of the surface, and so on through the list of auriferous discoveries, the stories of which are often really interesting, even to the mind which is free from the gold fever, now fast spreading again throughout the continent of Australia. There were my couple, oblivious of anything else, calculating the value of each nugget, and reckoning what they could do with the money. The result of all this was that nothing would satisfy them but they must go to Ballarat, the nearest place to Melbourne in which gold mines are now to be found; and as it has been in everything else since we started, the will of the majority—I am ever in the minority—carried the day. So we prepared for Ballarat. It was in vain I explained that nuggets are not found in such mines as exist at Ballarat; that the difference between operations in the quartz and the alluvial is such as to make the journey (from their particular point of view) fruitless.

In due course we arrived at the Band and Albion mine (or claim, as such ventures are still called here), the biggest and most successful of the shafts in this neighborhood, and, having presented our papers, were permitted the pleasures of an inspection. There is no necessity for me to go through a description of quartz-crushing, the throwing down of the gold by its own weight, its attachment by means of mercury, the searching and attracting process of the shaking tables, or any of the other means to the end of obtaining the precious metal from crushed quartz and its accompanying pyrites. Anyone who wants to know all about these things can find them set out fully and far more effectively than I could set them out, even if I had space, in books and treatises devoted to mining in all its ramifications. There is no necessity for anyone to come to Australia to see the battering and extracting processes; thousands of tons of quartz are sent home to be crushed and washed and assayed, and whatever else is necessary, by English means and machinery. Suffice it to say here that what my companions saw was widely different from what they expected. All their dreams of men shovelling up earth, from which they picked great lumps or small lumps (but always lumps) of bright red gold—dreams which I had vainly endeavored for days to show were dreams and dreams only—vanished directly our guide began to explain the mechanical appliances, the way in which the pyrites detritus is dried and ground and made into boiler paint, as well as the rest of the details which must be familiar to so many. There can hardly have been an exhibition of any

importance in England or out of it during the last thirty years but has contained models, often in actual work, of these various machines, together with all sorts of samples and specimens of the results attained by them. Presently, however, we did see something that was interesting even to me. By great good luck we arrived on the ground just as the battery manager was going through the concluding portion of his smelting operations for the week—once every seven days the Band and Albion people cast into a solid block of metal as pure as it can be got the result of the week's mining, blasting, battering, throwing down, mercury-attaching, and shaky-tabling operations. When we got into the room sacred to this smelting work the gold was bubbling in a crucible, just like broth simmers in a pot. Every now and again, as the furnace man threw in the saltpetre, borax, and whatever else it is that is used to give the last purifying touches, or withdrew them with their metallic attachments, we were permitted a peep at this precious liquor, which, before we had been there very long, was ready to be turned out into the in-got mould that, greased for the purpose, stood ready to receive it. With a strong and steady grip of the tongs, and without any apparent care for the intense heat which, when the fire was at last thrown open, seemed as though it would burn the eyes out of our heads, though we stood at some distance away, the manager took up the crucible and poured the most valuable stream I ever saw in my life into the mould, where, after giving off as many colors as a dying dolphin, it was soon cooled. When weighed, the tally was 400 ounces, or say £1,650 sterling worth of gold, which may be taken as a fair average for recent years, though in days gone by they have in a week secured as many as 1,000 ounces. In the period of the alluvial, before the quartz reef was struck, when nuggets and dust came up by the bucketful, the Band and Albion was still more profitable. The yield is now about an ounce and a quarter of pure metal to the ton of quartz. Besides the gold, the pyrites, as I have already intimated, pays for the work expended on it. Fifty per cent. of the result may be taken as the cost of working. Thus, 200 ounces of the 400 ounces we saw turned out would be net profit—that is, profit over and above the expenses of men and machinery. As the mine paid almost from the first sinking—Band of Hope, it was then called, and a junction was afterwards effected with a neighbor, the Albion—the number of proprietors and the amount of capital invested are sufficiently small to make this very profitable. In proof of this, I will conclude with the announcement that, during its twenty years of existence, the Band and Albion has produced no less than twenty-six tons of pure gold.

Since the day of our visit I have often wondered whether, if I had refused to go, and the other two had, as they insisted they in such case would do, gone by themselves—whether either or both would at the last moment have gone down the shaft. I don't like to be unjust, but I certainly don't think both of them would have gone, and I hardly think one would have gone without the other. After inspecting the stuff that came up from the mine, all their preconceived as well as their last lingering hopes of nuggets, or even of bits of gold no bigger than pins' heads, had departed, and there was really no reason whatever for going down beyond the reason that you could say you had been down afterwards; and that, as we have good authority for knowing, can always be done without the actual trouble of descending into the earth's bowels. Now came my opportunity. This was not a venture of mine—far from it; I had for a

variety of reasons never encouraged it, but having got so far I had not the slightest idea of turning back until the work was accomplished. It was necessary, owing to the constant dripping of water both in the shaft and cuttings which led from it, that we should cover ourselves up, and this we did with as grotesque a collection of old clothes as ever was got together. To enter into details is hardly necessary; but to make the picture completer I may as well tell you what our outfit was. Dirty overall trousers of canvas, an old pair of what are called half-boots, but which were in this instance quite big enough to be whole ones, and a white (or what had once been white) duck jacket, the look of which I wouldn't have minded at all if it had been but dry—it had been used in the morning by one of the directors and I had to wring the wet out before putting it over my own clothes—an old sou'-wester, and my preparations were complete. Mrs. PEN. got a skirt and a waterproof cloak, and an old bonnet; in Covent Garden so attired she could easily have obtained work shelling peas or carrying baskets. Except that his costume was not so new as the clothes usually worn by him, and that they were not made by Poole, I did not notice any particular change in Mr. Stephens' appearance.

When people go down a coal mine in England, and think they have done something wonderful, they go down a wide, well-drained and equally well-ventilated shaft, seated in a comfortable cage—they might almost be in one of the lifts at the stores so far as concerns lack of violence to their feelings. Here all was different. There was no cage, nothing but the cross-bar, or 'saddle,' upon which the galvanised iron troughs came up full of quartz or went down empty. The shaft was not above four feet square, and as we took our stand upon the wet and dirty piece of iron from which a trough was shifted to make room for us, the water from above poured on us in streams. Mr. Stephens elected to wait above until we had gone down, and so Mrs. Pen. and myself, in company with a guide, departed. There was plenty of room for four of us, standing close together, as was shown by us all ascending on the one 'saddle,' but S. G. prefers to do things his own way; he has done them his own way as far as we have gone, and there was no reason, I suppose, why an alteration should be made in this particular. No matter how crowded on the "saddle" you may be, you can't fall off, as there isn't space enough, but you might easily get your head knocked off, or meet with some similar slight disadvantage, if you did not keep quite steady. Down—down—down, in absolute darkness, for about a minute, when the platform on which we stood gave a lurch and a swing, which made my wife tighten her hold on me and give vent to a smothered groan. 'We are now six hundred feet down—I know that mark well; it was there'—and then, as though that story might not be exactly what was fitting under the circumstances, our guide broke off, and we went on in silence. 'That's the thousand-foot mark,' said he presently; 'another hundred—' And hardly had the words escaped him than we bumped upon the hard earth at the bottom of a pit eleven hundred feet deep. Mrs. Pen. would have been very glad to get out at the bottom if she hadn't been so awfully troubled by the knowledge that she had to get to the top again. Mr. Stephens having in due course joined us, candles were handed round and lighted, and we went upon our travels. And we might just as well have stayed up above for all there was to see below. The cutting is very small, just big enough to allow the troughs containing the

quartz to run on a two-foot tramway, and the water is always four inches, and sometimes six inches, deep throughout. Often we had to get down and almost crawl, and the number of times I had to stoop in the ordinary parts so as to avoid knocking my head made me feel like a veritable Gulliver in the neighbourhood of Blefuson. We had to do almost as much wading. Mrs. P., who had not changed her boots, and who flatly refused to get into one of the troughs and squat down in the wet bottom so as to let her head go free under the drooping roof, soon had to be left in a safe corner trying to pick pieces of gold out of the quartz wall, while we pushed on to see what we could see where the miners were working. After desperate struggles we at last came to that part of the reef which was being operated upon, and there being no fans or other apparatus for ventilating the mine, and it now being very far from the shaft, the heat was intense. One of the men at work, in reply to my comment on the heat, took up his shirt and wrung the perspiration out of it. I climbed up a rude scaffolding and got into a hole where a man sat, chip, chip, chipping all by himself, but I might just as well have got into a baker's oven just before drawing time, the heat was that intense; so I came away again. After a rest for a minute we partly waded, partly crawled, partly groped our way back again to where Mrs. P. stood in agonies of apprehension and little less than a pool of water. She had wandered from her coigne of vantage, a rush of air had blown out her candle, and visions of all sorts of dread and danger gibbered and made darkness horrible around her. As soon as we got to the bottom of the shaft we huddled together, and, drenched and miserable, in due course reached daylight again, without anything worse having happened to us than I have described. In lieu of nuggets Mrs. Pen. and Mr. Stephens found some really fine specimens of the nasal and bronchial catarrh, and they now bark and snort and grunt and talk through their noses, and drink hot rum with honey and butter in it, and buy all sorts of cough and cold specifics, and have their feet in hot gruel and bran mash, and stick mustard plaisters all over themselves, and generally make their wretched travelling companion's life intolerable. And through it all they pretend now that they thoroughly enjoyed themselves. I know I didn't; and I don't suppose for a moment they did."

Mining in British Columbia.

Extracts from Mr. Koch's valuable report to the Local Government on the Cariboo Quartz Ledges.

PATENT PROCESSES.

"I must give you warning by calling your attention to the many processes being placed before the public, or before men not skilled in such business as mining and milling ore, for they are the only ones who can be led astray into such wild and impracticable schemes as some of the processes are.

"I will refer you to some of the failures, and if your memory does not serve you well in the matter you can get full particulars from Wm. Ireland, jr., State geologist of California.

"The first one in my mind was introduced by a man I think named Mears, in Chili, ten or more years ago. He became the rage in that great mining country. His process was, of course, a secret. His trials, like all such, were however public; even those likely to fall into the trap were invited to make tests for themselves, all with good results.

"Many wealthy men became bankrupt by buying mines which were too poor to be worked by ordinary process. The promoter was presumably interested in such sales. The matter became so public, and so many had invested their all, that an investigation was had, which resulted in the fraud being exposed and the promoter sent to prison, and, if alive, he is perhaps there yet.

"Among the more recent patent processes is the Frier process.

"Some twenty-two years ago, Meadow Lake district was discovered in the Sierra Nevada mountains, about thirty-five miles from the Central Pacific railroad. The veins were extremely large and well defined, many of them rich. A large town grew up, as it were, in a day; mills built and mines opened, when, to the consternation of all, the ores were found to be refractory, and up to this time they have baffled the most skilful manipulators. About ten years ago, a man named Frier gave out that he had discovered a process by which the ore could be worked. I, with many others, think that he was honest in his belief; but after men of means had spent thousands of dollars in the erection of reduction works it proved to be an utter failure, and to this day, the rich veins of Meadow Lake lie dormant. A San Francisco company by latest advices are shipping in, and erecting a mill, to cost one hundred and fifty thousand dollars. Let us hope the mystery has been solved as to the proper treatment of the ores.

"A more recent process is one started some five years ago in San Francisco and lately revived in Victoria. I had the satisfaction of investigating it some time ago, soon after it was made public. Small works were erected in Sacramento, but never started.

"It was taken east, and I was told that Jay Gould, and other moneyed men, all ignorant of such matters, took stock, and erected works in Colorado. If so, they quietly closed them down; not one of them is at work either in California, or, to my knowledge, in any other country in the world. Every mining man in the world would hail with delight such a process if it were feasible.

"I cannot well afford to make the effort I am now making on behalf of your people, and government, and see my work hampered by having some patent process sprung upon the public, and proved to be an unmitigated failure after costing individuals or the government thousands of dollars; and the fault be laid on the mines as being valueless. I refer those that have witnessed the process, and feel anxious to investigate, to such men as Wm. Ireland, jr., State geologist; Prof. Price, assayer and chemist; C. A. Luckhardt, of Nevada metallurgical works, and H. Kustell, assayer, all prominent men in that branch in San Francisco. Either will be pleased to give them information on the subject.

"I must not let any patent process escape me for fear you may deem it applicable to your ores, because I neglected to report or state my views on the subject. I therefore call your attention to an article in the *Mainland Guardian* of July 31st, 1886.

"I do not deny the possibility of saving the gold by the process referred to in the article; but the very fact of the pulp or ground ore having to pass over a bath of melted copper explains at once that the ore must be dry-crushed, that process at once reduces the crushing capacity of the mill over one-fourth as compared with wet-crushing; and the same per diem cost of fuel and skilled labor goes on.

"Next, in order to reach the gold, all the crushed ore, sulphurets, and vein gangue alike must pass over the molten bath which requires

fuel and skill to keep to the requisite temperature as well also does it require skill to keep the pulp passing evenly over the bath, and lastly when your gold is gathered, you must resort to the expensive method of parting the precious metals from the copper, which process alone would go far towards de-sulphurising and chloridizing as now done in California.

DIFFERENCE IN COST OF MINING IN BRITISH COLUMBIA AS COMPARED WITH CALIFORNIA.

"In the absence of statistics, I will attempt to show the difference in the cost of mining and milling in California as compared with Cariboo, and the very probable results to be obtained from the energetic, careful and scientific handling of your large and well defined gold-bearing veins.

"Skilled labor, which includes mechanical engineers, smiths, millmen, and chloridizers costs, in California, about four dollars per diem.

"First-class miners and blasters cost \$3, and second-class from \$2.75 to \$2.50. Outside labor, including Chinese, averages \$2 per diem. Wood, for steam purposes will, no doubt, average, at this time, five and a half dollars per cord, while the ores milled do not, in my opinion, yield to exceed eight and a half dollars per ton. That estimate may seem small to a California miner, but when it is remembered the enormous quantities of low-grade ores milled by such companies as the Plumas-Eureka, Sierra Buttes, Douglas Island, Doctor Zielie mine, and many others, it greatly reduces the average as compared with the few stamps milling \$12 to \$20 ore. And yet the far-seeing capitalist of California finds investment in a quartz mine one of his best investments, and does not hesitate to erect the best machinery that skill can invent, whereby mining may be made a legitimate branch of industry; and my examination of your veins has led me to carefully study the situation as compared with the above. I find skilled labor, as above, will perhaps cost \$6 per diem, good miners \$4, second-class \$3.50, while outside labor costs \$3, and wood not to exceed \$3 per cord.

"While I feel safe in placing the milling value of your ores at from \$17.50 to \$20 per ton, and I feel confident that those figures can be safely advanced from ten to twenty per cent., but I have endeavored to be cautious in the examination of your mines, and my statements to your people, and do not wish to cause them to be over sanguine until milling results are reached. I have made the above estimates as to cost after talking with your most prominent citizens, and estimate the value of your ores after making over fifty assays from the different veins, and carefully testing the feasibility of chloridizing the sulphurets contained in the ore.

MINERALOGICAL SURVEY.

"I deem it of the greatest importance to the province that a systematic mineralogical survey be made, not alone of this immediate vicinity, but of the outlying and surrounding country. The survey should be so managed as to keep pace with the prospector, rather than neglect the work commenced by extending the examination too far beyond present work; for, by extending the survey beyond present developments, you deprive the prospector of the assistance and advice of your engineer.

"As I have previously stated the government can materially aid and assist the prospector in his work of development, and often save him much time and money by having an intelligent and practical engineer near by to consult and to

advise him as to the best method to prospect his ground, and, as to the probability of reaching pay-ore.

"In this connection I will state that I see a bill is presented before the house in New Zealand whereby it is proposed to appropriate one hundred thousand pounds to aid in developing the mineral resources of the colony; while the United States has, perhaps, the most complete and extensive mineralogical survey system of any country in the world, and the result is—what? English and French capital come to the United States in preference to any other country. They read, and have the mineral resources of the country explained to them constantly.

"Following upon the heels of the annual mineralogical report, enterprising men go to London and Paris well supplied with samples of ore, and elaborate maps of mining property, and gifted with national go-ahead-iveness and never-let-go, they annually induce a large amount of capital to come into California, Nevada, Colorado, Idaho, New Mexico and Arizona. Not one of these states or territories but have large English and French companies successfully at work; and the more capital they invest the better they are pleased in case it yields from six to ten per cent per annum.

"The capital can be turned hitherward; not, however, by sitting supinely waiting for its coming.

"Ask an Englishman which he would prefer—Canada or the United States, and why, and he will answer "The United States, because there is more dash, enterprise and go ahead amongst the people." Including Alaska, Oregon, California, Idaho and Montana, mining industries have almost surrounded you, and the outside world scarcely knows that you are the possessors of such promising and well-defined gold and silver-bearing veins.

"Several years ago so eminent a man as Prof. Dawson took with him to Montreal samples of the quartz broken from the croppings of your veins, and reported to you from five to six dollars per ton, and encouraged you to hunt in those veins for richer ore, as they were, beyond doubt, the sources of the many millions of coarse gold intermixed with quartz taken from your creeks and benches, and no richer placer diggings were ever discovered than your creeks and benches through which the veins pass. Do not forget that the mountain will not come to you; on the contrary you must seek capital and give it encouragement, and the day will come when your district will again rank as formerly amongst the great gold producers.

"Capital, at present, is seeking investment in the most remote corners of the globe. All manufacturing industries are overdone. Silver is a drug upon the market and can scarcely hold its place as a circulating medium, while, (including the product of the entire world) gold enough is not now produced to supply the arts and sciences. Then why not use energy and push enough to induce English capital to come to your district?

"In referring to capital seeking investment I may refer you to the circumstance of an English company formed to work the gold quartz found in South Africa. In order to be well equipped in every detail, their mill was built in San Francisco, shipped overland to New York, thence to England and transhipped to Natal on the south coast, where it had to be hauled by cattle seven hundred miles inland. Also, one of a hundred stamps and necessary amalgamating pans was built in San Francisco and shipped to Peru, where, by rail and mules it had to reach the giddy height of thirteen thousand feet, near the

summit of the Andes Mountains, to work a silver mine.

MANAGERS OF MILLS AND MINING PROPERTY.

"I can not too strongly impress upon the minds of those proposing to invest in, or operate mines, in this district, the great importance of selecting none but the most competent of men for their managers. They should come with good references as to ability and integrity.

"Favoritism, friendship, partnership, good honest men and too old to work, and such like considerations that can be advanced for making appointments, which might lead to the ruin of a company, or, at least, the useless expenditure of thousands of dollars, should all be discarded.

"The day is past for appointing ministers out of place, highly-educated physicians and lawyers or rich men's sons just out of college, because their fathers are largely interested.

"Appoint some man who has had years of experience of vein mining, one who has cost some San Francisco or Eastern company half a million of dollars by some blunder made years ago. He has had experience, and blushes, and wonders how he could have made such mistakes as he has. He will, even now, make small mistakes, but he is quick to discover and remedy them. Good men can be procured, men that have worked in and helped to open the finest mines in the world.

"A manager should be able to run an engine, know how to run a mill in all its branches, know when each stamp is doing duty, detect a loose mortar bolt, cut out any kind of timbers for shaft, drift or elsewhere, sharp a pick or drill, and, in fact, he must, be a miniature encyclopædia, and he must be honest, temperate and kind.

Meeting of the Austin Mining Company (Limited.)

The annual general meeting of the shareholders of this company was held at the company's office in Ottawa, on the 28th ult., the meeting being largely attended by those interested. Little was done beyond the election of directors, the new board being, Hon. W. A. Henry, G. H. Perley, J. A. Gemmill, E. Grant Powell, J. F. Nellis and G. F. Austin. The operations of this company have been much hindered and obstructed by the action of some of the holders of paid up shares, but now that the management has got into the hands of capable men it is to be hoped there will be no further obstruction, and that capital may be secured to put the property on a working basis.

Alfred Krupp, the world famous German miner and manufacturer, employed in 1881 no less than 19,605 hands, upon whom were dependent others to the number of 45,776. In other words, the people whose bread is earned in Krupp's works, would fill a city of 65,381 inhabitants.

The *London Iron Trade Exchange* says, "that returns of the mineral production of France in the first six months of the year show that the output of coal was 9,696,573 tons, an increase of 319,862 tons on the same six months of 1885. The manufacture of pig iron fell from 829,366 tons in 1885 to 763,225 tons in 1886; puddled iron rails from 1,468 tons to 480 tons; merchant iron from 332,795 tons to 326,023 tons; sheet iron from 59,829 tons to 47,620 tons, and steel rails from 182,084 tons to 146,269 tons, and steel plates from 25,638 tons to 22,987 tons. The production of merchant steel rose from 4,237 tons last year to 55,538 tons in 1886."

MINING NOTES

Nova Scotia.

The main shaft of the Cowan gold mining company has already yielded upwards of \$20,000.

The Annapolis *Spectator* announces the discovery of a rich lead of gold bearing quartz in Caledonia. The samples shown by Mr. Charles Ford, of Maitland, are said to indicate unusual richness.

We learn from a recent issue of the *Critic* that Mr. R. Macnaughton has brought to Halifax 600 ounces of gold, the September product of the Rawdon Mines, and that a new 25 stamp mill is now in operation there.

A local exchange informs us that a brick of gold weighing 319 ounces and valued at over six thousand dollars was brought to Halifax, N.S., from the Oxford mines at East Halifax. It represents thirty days' work of three men.

The work at the Coxheath copper mine of cross cutting from the shafts at the 200-foot level directly to the new vein, 70 feet north is now being carried on. Some 180 feet has already been accomplished, proving the continuity of the ore body for that distance.

On Wednesday, 22nd ult., a fire broke out in one of the engine houses at the Albert mines, Albert County, and five buildings, including engine house, blacksmiths' shop, carpenters' shop, a dwelling and store house were completely destroyed. No estimate has been given of the loss, which is not covered by insurance. It is thought that the conflagration was the work of some unknown incendiary.

The gold mining outlook, says the *Critic*, grows brighter and brighter every day. New finds are frequently reported, and best of all the capital to develop them is at once forthcoming. The find at Malaga Lake, in Queen's County, is likely to prove one of the richest in the Province, but unfortunately it seems destined to undergo the same trials as the famous Salmon River mine. Rival claimants are in the field, and as the property is undoubtedly very rich, a settlement will hardly be reached without an appeal to the courts. Under the system at present in vogue of taking up mining claims, it is the easiest thing in the world to put in a bogus application and force properties into litigation. No capitalist will look at a mining property in the title to which there is the slightest suspicion of a flaw, and, taking advantage of this, unprincipled men make a contest on the most frivolous pretext and often succeed, where the real owners are anxious to sell, in forcing a compromise and getting an entirely unmerited share of the mine. This business has been reduced almost to a science, and if not put a stop to in some way, is bound to do immense harm to the gold mining industry. We do not know that these remarks apply to the Malaga Lake contest, as we are not familiar with the points at issue, but we do know that similar tactics have succeeded in numerous other cases.

A radical cure must be found for the evil, and we would almost favor making it a penal offense to put in a bogus claim to a mine. In most cases it is simply an attempt to extort money through false pretenses, and should be punished accordingly. A party contesting should be obliged not only to furnish security for costs in case he failed in the suit, but also security for any damage that the owner incurred through the contest. This alone would prevent any but *bona fide* claims being raised. Time is everything to a mine owner, and any disputes should be adjudicated upon at once, and it might be well to have them referred to a mixed board of arbitrators, composed of mining experts and judges of the Supreme Court, where decisions in all cases should be final. When the Mining Association is organized, this subject should be one of the first to demand attention. It is an easy matter to drive capital away from a country, but a most difficult matter to restore confidence where it has once been lost. Outside of this one cloud of litigation, the mining horizon is clear. The capitalists now investing their money in this Province are also practical miners, and are not to be made the dupes of dishonest men. The day of the cunning mine manipulator has gone by and the best proof of the value of the gold mining industry in Nova Scotia lies in the fact that mines are now bought and sold solely on their merits.

New Brunswick.

The mines at Markhamville are said to be shipping manganese all the year round.

Operations at the manganese deposit near Sussex have been suspended, pending an equity suit. The mine has been leased and worked by a Mr. F. W. Stockton, but another mining expert claims an interest, which is repudiated, and hence the action.

Quebec.

A new company styled the St. Lawrence Corporation (Ld.) has been organized in London, Eng., with a capital of £100,000, 100,000 shares of £1 each. The objects of this corporation are to purchase, lease, or otherwise acquire, hold and work timber and other lands, mines, minerals, hereditaments, and premises in the Dominion of Canada, and in particular the lands and estate known as the Mille Vaches Estate, in the county and district of Saguenay, bounded in front by the river St. Lawrence and behind by the public domain, on the south by the township of Iberville, and on the north by the township of Laval, together with all the timber, and all minerals on and under the surface, the houses, and other appurtenances, and all rights, and to acquire and undertake all or any of the assets, debts and liabilities of the Dominion of Canada Freehold Estate and Timber Company, Limited.

Ontario.

The first shipments of Canadian Iron ore to Lake Erie Ports was made to Cleveland last month and consisted of 540 tons. The mines on the Central Ontario Railroad, owned by a Cleveland Syndicate, have been shut down owing to a cessation of demand since last March. The *Cleveland Iron Trade Review* says that during 1885, 10,508 tons were shipped from these mines, of which 100 tons went to Bessemer, Pa., and the remainder to Cleveland. There were mined, however, during 1885, 32,059 gross tons, of which 3,752 tons were second-class ore. It will thus be seen that 21,551 tons were added to the stock-piles last year, besides the amount mined from January 1st to March 31st inclusive,

this year. It is understood that the cessation of demand for this ore was owing to the presence of titanium, which rendered roasting necessary, and that no more ore will be mined until that on hand is first roasted. It is also known that the ore already delivered on Cleveland blast-furnace docks is roasted before using.

THUNDER BAY DISTRICT.

The mill at the Rabbit Mountain Mine is now running very smoothly and is said to be stamping about \$250 a day.

Messrs. Harvey & McInnis are having their property at Silver Mountain surveyed, and as soon as the waggon road is constructed they will proceed with the work of development.

Mr. H. Wilson, of Mount Forest, reports that a stock company, with a capital of \$150,000 has been formed to develop the Heron Bay Mine. This property is very conveniently situated close to the railway station.

A new Prospect is just being opened on the Port Arthur side of the Beaver Mine. Messrs. Crawford & Corbett are taking out rock bearing quantities of argentiferous galena. Some very fine specimens are being shewn.

Mr. T. A. Keefer has commenced operations at the Little Pig Mine. This property, which adjoins the north end of the Silver Creek Mine and the Beaver Mill on the west, is owned by himself and Mr. Oliver Donnais.

Recent reports from the Silver Falls Mine (43 miles from Port Arthur) indicate that ore will be struck soon. The shaft is now down about fifty-two feet and the water fills in so rapidly that an engine is needed to pump it out.

Operations at the Beaver Mills are expected to be begun about the middle of this month. The houses, shops and mills at this mine are very systematically laid out. Mr. White has charge of the mechanical department and Mr. Crow is reputed a thoroughly practical and experienced miner.

A party of prominent miners and capitalists, including Mr. Alex. McEwen and his three sons, Messrs. G. A. Thompson, A. J. Duffield, and T. A. Keefer, received Sir A. T. Galt and a number of British capitalists quite recently at Port Arthur. The object of their visit to the district was ostensibly to re-open the Silver Islet Mines and to organize for a thorough exploration and development of the gold and silver mining region on the North Shore of Lake Superior.

During the past month the Rabbit Mountain Mine was visited by J. H. Burwell, general manager of Mast Buford & Burwell, machinery house; R. B. Nalusha, general solicitor of the St. P., M. & M. road; H. Sahlgaard, real estate dealer, and vice-consul of Sweden and Norway, all of St. Paul, and John Crubach, railway contractor and bridge builder, Rock Island. The party were delighted with their visit and carried away with them a silver bar weighing 37 1/2 lbs., 95 per cent. of which is solid silver. The mine is owned and controlled largely by St. Paul parties, and it is their intention to enlarge the working capacity to a considerable extent. At present they have a shaft about 120 feet down

and have commenced to work on levels and side cuts.

Several complaints are being made by the miners about the bad condition of the roads in the district, which they say prevents anything like a systematic development of their properties. The road on the other side of the Silver Mountain is in a particularly wretched condition, travel being much impeded by large numbers of stumps from two to three feet high. In winter fully three feet of snow will be required to make the road fairly passable. An expenditure of one thousand dollars should be sufficient to make a good winter road here. As matters stand at present the average rate for carrying freight and supplies is about two cents per pound, a heavy tariff very detrimental to the progress of development, and in the interests of the country it is desirable that steps be taken as soon as possible to have these obstructions removed and the road placed in a passable condition.

The following gentlemen constitute the first Board of Directors of the recently organised Thunder Bay Colonization Railway Company: Thomas Marks, merchant; D. F. Burke, capitalist; George T. Marks, merchant; George H. Macdonell, contractor; Thomas S. T. Smellie, physician; W. G. Smith, merchant; Michael Dwyer, contractor; Allen R. Macdonnell, contractor; T. A. Gorham, barrister. Referring to this the *Sentinel* writes:—"It is our pleasant duty to chronicle the arrival at Port Arthur of the first silver brick ever manufactured in this district from Thunder Bay ore. Although, of course, in the past large quantities of barrelled ore as it came from the mine, and concentrates from the various mills, have been shipped. The Rabbit Mountain Mining Company is the first institution to have built a mill which produces silver by amalgamation as well as by concentration. The bar in question weighs about forty-five pounds and it is rendered doubly valuable in the eyes of mining men from the fact that the whole of this has been collected from the tailings which have passed over the ordinary Frue vanners, and the silver of which in the mills heretofore built in the district was also entirely lost to the proprietors. To those unlearned in mines it is hard to understand the value of the product from samples of the concentrates, but the most unlettered in a mining way can readily see and understand its product when of pure silver. The bearing of each of these interesting events have a most important effect on one another. Without the Thunder Bay Colonization Railway the mines cannot be worked to their full extent, nor can they be worked as economically as their most ardent admirers would desire. And without the mines one of the most important factors in the future success of the railroad's traffic returns would be wanting.

From present indications we are happy to say that we are not only likely to have the railway, but that beyond peradventure the mines of the Thunder Bay district will play an important part in furnishing traffic for the new line."

Manitoba.

Work at the Cascade Coal Mines, near Banff, is being vigorously pursued, and the owners will soon place their anthracite coal in the market at Winnipeg. The Canadian Pacific Railway have been using it on some of their engine, running on heavy grades, but their report of the test is not yet available. The Canada Anthracite Coal Company are putting new machinery in place,

and are doing everything in their power to conduce to the full development of their property.

British Columbia.

A number of men are out in the country to the north of Bayne's Sound prospecting for gold.

Mr. Krail, a mining expert, who visited the interior a few months ago, and then went to California, has returned to Victoria. He states that this country is rich in minerals, and will locate permanently here. He is examining a ledge 14 miles from the city and will soon report on its value.

Mr. J. M. Smith, who has recently been engaged in collecting geological specimens for the local government, brought from the Selkirks a number of valuable specimens of mineral ores. Amongst other samples was one thirty pounds in weight taken from the Kerr, Corbin and Kennedy claim near the summit of the Selkirks, about 30 miles east of Farwell. An assay made of this ore went as high as \$700 to the ton. The owners refuse to sell, having means enough of their own to work the lead effectively, and have sent forward a carload of the ore to be smelted at Chicago. Mr. Smith also brings with him samples of gold-bearing free milling ore from the Bonanza King or Bright & Tayford lead in the Big Bend district; and in addition, a specimen of silver ore from a mine at Spellmeheen, about 30 miles from Farwell, which assays \$116 to the ton.

Mr. G. A. Koch, a mining engineer, who has been for some time past testing the value of quartz ledges in the Cariboo district, for the local government, expresses the opinion that gravel mining in this district is virtually worked out. He reports the quartz interests throughout the whole district as good, and gives the following information regarding the mineral wealth and the various gold bearing properties in and around Cariboo.

There is a ledge called the Bonanza upon which the B. C. Mining and Milling Co. have located their claim; and have got a shaft down 100 feet from the surface passing through a vein 23 feet wide. Mr. Dunlevy, of Soda creek, has got engine power on his claim on Island mountain sufficient for 20 stamps, and all the power necessary for the concentration of the ore. The B. C. M. & M. Co. have got machinery for 40 stamps, which was formerly bought for the free milling process. Mr. Koch has made no less than 100 assays of ore taken from lodes in the Cariboo district, and in his report to the government states, that the ores average from \$17.50 to \$20 per ton. The cost of mining and milling these sulphurets ores will not exceed that of mining and milling free gold ores, because the cost will more than offset the cost of the closer milling necessary for sulphurets, so that the percentage is in favor of mining the latter class of ore. Aside from these considerations, free milling mines are as it were, only of a day, while the sulphurets are well known to be continuous. There is, for instance, the Providence mine in Nevada county, and the Dr. Zealy mine in Calaveras county, California, which have been working for many years, paying well, though the ore of the latter mine only averages \$6.50 per ton. From the Treadwell mine (Douglas Island) owned by Senator J. P. Jones and others, a parlor test was sent to San Francisco which returned \$7 to the ton, which was sufficient to convince them that they could make a perfect success. The first mill forwarded was a five stamp on

and its workings confirmed the first test. Then they despatched a 120-stamp mill which is now in full blast, producing a proportionate yield. It is moreover said that another mill of the same capacity will shortly be likewise set at work there. Mr. Koch has assayed over \$600 to the ton from the ore of Island Mountain, made, not from selected samples but from extremely rich sulphurets which exist all through the ore, while again, sulphurets can easily be found that are very poor. The average of the sulphurets of this province, he says, are far richer than those of California. In one instance out of two pounds of sulphuret Mr. Koch took out gold amounting to four thousand dollars per ton, which must not however, be confounded with the average result. There are no means of determining where these rich spots occur, they are so minute and so generally distributed through the veins. He considers that the veins will prove to be permanent and that this province is destined to become a great gold mining country. The only question is that of freight and duties, as it is an impossibility for mining machinery to be made at Montreal until they have had experience: consequently, the machinery will have to be imported from San Francisco.

Mr. Koch has shipped a box of samples of these ores to the Toronto exhibition, and will take with him to San Francisco, a similar lot of samples for exhibition to mining men. The formation of the country, he declares, to be identical with that of California—slate, granite, porphyry, etc.—but with richer sulphurets.

El Callao, the great Venezuelan gold mine, produced and sent to England \$293,000 for July, out of which a dividend of \$6.20 per share was paid, aggregating \$257,600.

We are informed that operations at the Wright silver mine, near Lake Temiscamingue, are being vigorously pushed. An expensive smelter has been completed, and the exportation of quartz has been rendered unnecessary in future.

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MINING REGULATIONS

To Govern the Disposal of

Mineral Lands other than Coal Lands.

1886.

THESE REGULATIONS shall be applicable to all Dominion Lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, iron, or other mineral deposits of economic value, with the exception of coal.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein, either by surface or subterranean prospecting, for mineral deposits, with a view to obtaining under the Regulations a mining location for the same, but no mining location or mining claim shall be granted until the discovery of the vein, lode, or deposit of mineral or metal within the limits of the location or claim.

QUARTZ MINING.

A location for mining, except for iron, on veins, lodes, or ledges of quartz or other rock in place, shall not exceed forty acres in area. Its length shall not be more than three times its breadth, and its surface boundary shall be four straight lines, the opposite sides of which shall be parallel, except where prior locations would prevent, in which case it may be of such a shape as may be approved of by the Superintendent of Mines.

Any person having discovered a mineral deposit may obtain a mining location therefor, in the manner set forth in the Regulations which provide for the character of the survey and the marks necessary to designate the location on the ground.

When the location has been marked conformably to the requirements of the Regulations, the claimant shall, within sixty days thereafter, file with the local agent in the Dominion Lands Office for the district in which the location is situated, a declaration or oath setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as aforesaid; and shall, along with such declaration, pay to the said agent an entry fee of FIVE DOLLARS. The agent's receipt for such fee will be the claimant's authority to enter into possession of the location applied for.

At any time before the expiration of FIVE years from the date of his obtaining the agent's receipt, it shall be open to the claimant to purchase the location on filing with the local agent proof that he has expended not less than FIVE HUNDRED DOLLARS in actual mining operation on the same; but the claimant is required before the expiration of each of the five years, to prove that he has performed not less than ONE HUNDRED DOLLARS' worth of labour during the year in the actual development of his claim, and at the same time obtain a renewal of his location receipt, for which he is required to pay a fee of FIVE DOLLARS.

The price to be paid for a mining location shall be at the rate of FIVE DOLLARS PER ACRE, cash, and the sum of FIFTY DOLLARS extra for the survey of same.

Not more than one mining location shall be granted to any individual claimant upon the same lode or vein.

Iron—The Minister of the Interior may grant a location for the mining of iron, not exceeding 160 acres in area, which shall be bounded by north and south and east and west lines astronomically, and its breadth shall equal its length. Provided, that should any person making an application purporting to be for the purpose of mining iron thus obtain, whether in good faith or fraudulently, possession of a valuable mineral deposit other than iron, his right in such deposit shall be restricted to the area prescribed by the Regulations for other minerals, and the rest of the location shall revert to the Crown for such disposition as the Minister may direct.

The Regulations also provide for the manner in which land may be acquired for milling purposes, reduction works, or other works incidental to mining operations.

Locations taken up prior to this date may, until the 1st August, 1886, be re-marked and re-entered in conformity with the Regulations without payment of new fees, in cases where no existing interests would thereby be prejudicially affected.

PLACER MINING.

The Regulations laid down in respect of quartz mining shall be applicable to placer mining as far as they relate to entries, entry fees, assignments, marking of localities, agents' receipts, and generally where they can be applied.

The nature and size of placer mining claims are provided for in the Regulations, including bar, dry, lench, creek or hill diggings, and the RIGHTS AND DUTIES OF MINERS are fully set forth.

The Regulations apply also to

BED-ROCK FLUMES, DRAINAGE OF MINES, AND DITCHES.

The GENERAL PROVISIONS of the Regulations include the interpretation of expressions used therein; how disputes shall be heard and adjudicated upon; under what circumstances miners shall be entitled to absent themselves from their locations or diggings, &c., &c.

THE SCHEDULE OF MINING REGULATIONS

Contain the forms to be observed in the drawing up of all documents, such as:—"Application and affidavit of discoverer of quartz mine." "Receipt for fee paid by applicant for mining location." "Receipt for fee on extension of time for purchase of a mining location." "Patent of a mining location." "Certificate of the assignment of a mining location." "Application for grant for placer mining and affidavit of applicant." "Grant for placer mining." "Certificate of the assignment of a placer mining claim." "Grant to a bed-rock flume Company." "Grant for drainage." "Grant of right to divert water and construct ditches."

Since the publication, in 1884, of the Mining Regulation to govern the disposal of Dominion Mineral Lands, the same have been carefully and thoroughly revised with a view to ensure ample protection to the public interests and at the same time to encourage the prospector and miner in order that the mineral resources may be made valuable by development.

COPIES OF THE REGULATIONS MAY BE OBTAINED UPON APPLICATION TO THE DEPARTMENT OF THE INTERIOR.

A. M. BURGESS,

Deputy Minister of the Interior.



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DEPARTMENT OF INLAND REVENUE.

AN ACT RESPECTING AGRICULTURAL FERTILIZERS.

THE public is hereby notified that the provisions of the Act respecting AGRICULTURAL FERTILIZERS came into force on the 1ST of JANUARY, 1886, and that all Fertilizers sold thereafter require to be sold subject to the conditions and restrictions therein contained—the main features of which are as follows:—

The expression "fertilizer" means and includes all fertilizers which are sold at more than TEN DOLLARS per ton, and which contain ammonia or its equivalent of nitrogen, or phosphoric acid.

Every manufacturer or importer of fertilizers for sale, shall, in the course of the month of January in each year and before offering the said fertilizer for sale, transmit to the Minister of Inland Revenue, carriage paid, a sealed glass jar, containing at least two pounds of the fertilizer manufactured or imported by him, with the certificate of analysis of the same, together with an affidavit setting forth that such jar contains a fair average sample of the fertilizer manufactured or imported by him; and such sample shall be preserved by the Minister of Inland Revenue for the purpose of comparison with any sample of fertilizer which is obtained in the course of the twelve months then next ensuing from such manufacturer or importer, and which is transmitted to the chief analyst for analysis.

If the fertilizer is put up in packages, every such package intended for sale or distribution within Canada shall have the manufacturer's certificate of analysis placed upon or securely attached to each package by the manufacturer; if the fertilizer is in bags, it shall be distinctly stamped or printed upon each bag; if it is in barrels, it shall be either branded, stamped or printed upon the head of each barrel, or distinctly printed upon good paper and securely pasted upon the head of each barrel, or upon a tag securely attached to the head of each barrel; if it is in bulk, the manufacturer's certificate shall be produced and a copy given to each purchaser.

No fertilizer shall be sold or offered or exposed for sale unless a certificate of analysis and a sample of the same shall have been transmitted to the Minister of Inland Revenue, and the provisions of the foregoing sub-section have been complied with.

Every person who sells, or offers or exposes for sale, any fertilizer, in respect of which the provisions of this Act have not been complied with,—or who permits a certificate of analysis to be attached to any package, bag or barrel of such fertilizer, or to be produced to the inspector, to accompany the bill of inspection of such inspector, stating that the fertilizer contains a larger percentage of the constituents mentioned in sub-section No. 11 of the Act than is contained therein,—or who sells, offers or exposes for sale any fertilizer purporting to have been inspected and which does not contain the percentage of constituents mentioned in the next preceding section,—or who sells or offers or exposes for sale any fertilizer which does not contain the percentage of constituents mentioned in the manufacturer's certificate accompanying the same, shall be liable in each case to a penalty not exceeding fifty dollars for the first offence, and for each subsequent offence to a penalty not exceeding one hundred dollars: Provided always, that deficiency of one per centum of the ammonia or its equivalent of nitrogen, or of the phosphoric acid, claimed to be contained, shall not be considered as evidence of fraudulent intent.

The Act passed in the forty-seventh year of Her Majesty's reign, chaptered thirty-seven and intitled "an Act to prevent fraud in the manufacture and sale of agricultural fertilizers", is by this Act repealed, except in regard to any offence committed against it or any prosecution or other act commenced and not concluded or completed, and any payment of money due in respect of any provision thereof.

A copy of the Act may be obtained upon application to the Department of Inland Revenue.

E. MIALL,
Commissioner.



Tenders for a License to Cut Timber on Dominion Lands in the Province of British Columbia.

SEALED TENDERS addressed to the undersigned and marked "Tender for a Timber Berth," will be received at this Office on 11 noon on Monday, the 1st day of November next, for four timber berths of ten square miles each, more or less, numbered respectively 4, 5, 8 and 9, situated on Kicking Horse River, and Otter Tail Creek, a tributary of the Kicking Horse River, near Field and Otter Tail Stations, on the line of the Canadian Pacific Railway, in the Province of British Columbia.

Sketches showing the position, approximately, of these berths, together with the conditions on which they will be licensed, may be obtained at this Department or at the Crown Timber Offices, Winnipeg, Calgary, N.W.T., and New Westminster, British Columbia.

A. M. BURGESS,
Deputy of the
Minister of the Interior.

Department of the Interior,
Ottawa, 14th August, 1886.



Tenders for a License to Cut Timber on Dominion Lands in the Province of British Columbia.

SEALED TENDERS addressed to the undersigned and marked "Tender for a Timber Berth," will be received at this Office up to noon on Wednesday, the 1st day of December next, for three timber berths of fifty square miles each, more or less, numbered respectively 16, 17 and 18, situated on the west side of the Columbia River, near Golden City Station, on the line of the Canadian Pacific Railway, in the Province of British Columbia.

Sketches showing the position, approximately, of these berths, together with the conditions upon which they will be licensed, and the forms of tender therefor, may be obtained at this Department or at the Crown Timber Offices at Winnipeg, Calgary, N.W.T., and New Westminster, British Columbia.

A. M. BURGESS,
Deputy of the
Minister of the Interior.

Department of the Interior,
Ottawa, 9th September, 1886.

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Address all Communications to

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CANADIAN MINING REVIEW

Vol. 4.—No. 8.

1886—OTTAWA, NOVEMBER—1886.

Vol. 4.—No. 8.

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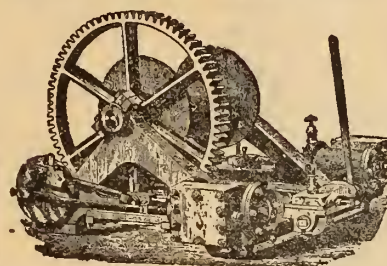
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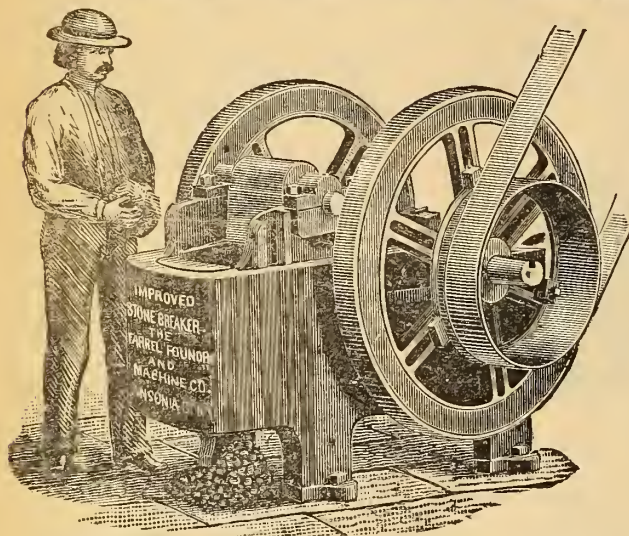
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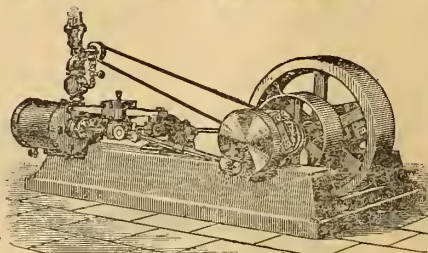
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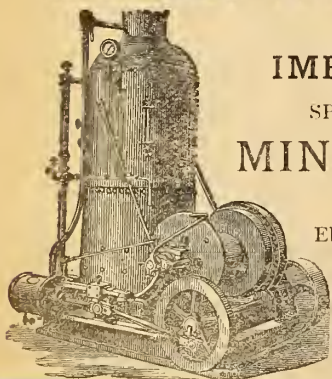
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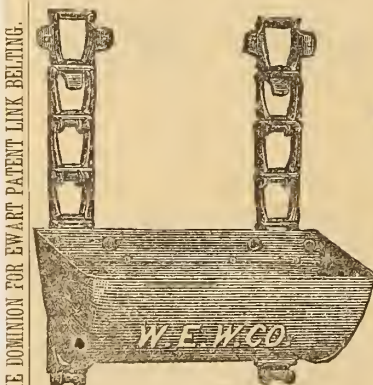
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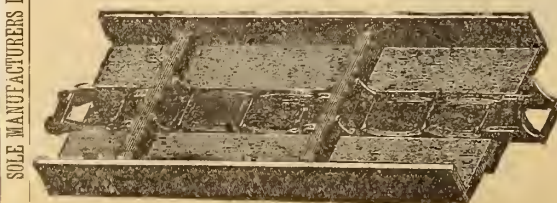
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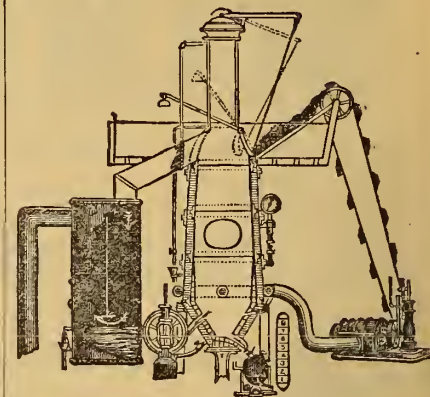
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MAIL CONTRACT.

SEALED TENDERS, addressed to the Post-
master General will be received at Ottawa until
noon on FRIDAY, 17th December, 1886, for the
conveyance of Her Majesty's Mails, on a proposed
Contract for four years, three times per week each
way, between ASHTON and PROSPECT, from the
1st January next.

Printed notices containing further information as
to conditions of proposed Contract may be seen and
blank forms of Tender may be obtained at the Post
Offices of Ashton, Munster, Dwyer Hill and Pros-
pect, and at this office.

T. P. FRENCH,

Post Office Inspector.

Post Office Inspector's Office,
Ottawa, 23rd Oct., 1886.

Notice to Contractors.

SEALED TENDERS addressed to the under-
signed will be received at this Office until
FRIDAY, the 19th instant, for the Clearing and
Removal of Snow, etc., from the Public buildings,
Ottawa; and also for the Removal of Snow, etc.,
from the roofs of buildings, out-buildings, walks,
avenues or roads, etc., etc., at Rideau Hall.

Forms of Tender and Specifications can be had
at this office, where all necessary information can
be obtained.

Separate Tenders will be required for each work,
and must be endorsed, "Tender for Removal of
Snow, Public Buildings," and "Removal of Snow,
Rideau Hall," respectively.

Each tender must be accompanied by an accept-
ed bank cheque made payable to the order of the
Honorable the Minister of Public Works, equal
to five per cent. of the amount of the tender, which
will be forfeited if the party decline to enter into a
contract when called upon to do so, or if he fail to
complete the work contracted for. If the tender be
not accepted the cheque will be returned.

The Department will not be bound to accept
the lowest or any tender.

By order,

A. GOBEIL,

Secretary

Department of Public Works,
Ottawa, 12th Nov., 1886.

Canadian Mining Review,

OTTAWA.

PUBLISHED MONTHLY.

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OFFICE:

UNION CHAMBERS, 14 Metcalfe Street.

The CANADIAN MINING REVIEW is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts as well as others interested in Canadian Mineral Lands are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 20th of the month.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

Many of our readers will regret to learn of the death of Mr. James W. Lynch, superintendent of the Derry Phosphate Mines, near Buckingham, Que. The deceased gentleman, who was favorably regarded in mining circles, passed away at Derry, on Thursday, 25th November, from an attack of inflammation of the lungs.

We learn that Mr. E. Gilpin, Inspector of Mines, succeeds the late Mr. John Kelly as Deputy Commissioner of Mines for the Province of Nova Scotia. The new appointment, and the amalgamation of the two offices thus provided, is very favorably received in mining circles throughout the province.

At the meeting of the Iron and Steel Institute, held last month in London, Eng., it was stated in one of the papers read, that a small amount of chromium added to steel renders that metal much harder and improves it for a variety of purposes. If this important fact be universally recognised it will undoubtedly create an increased demand for chromic iron, of which, as our readers know, there are large deposits in the Province of Quebec. Several large blocks of this metal were on exhibition at the Mineral Court of the Colonial and Indian Exhibition.

Messrs. Foster and Gregory, the gentlemen appointed by the Royal Commission to report on the minerals and rocks shewn at the Colonial Exhibition, have completed their examination of the Canadian exhibit. Mr. Foster, who is Her Majesty's inspector of mines for North Wales, reports particularly on the ores, building stones, and other

minerals of economic importance, and we learn that he expresses himself much pleased with the extent and excellence of the collection brought together by our geological survey. Particular mention is made of the large series of silver ores from the Port Arthur district, many of which are very rich, and he expresses the opinion that as that country is opened up, it will become one of the most important mining districts in the Dominion.

It will be remembered that several specimens of chromic Iron, from the Canadian Mineral Court, at the Colonial Exhibition, were recently tested by an English firm with a view to importation. The report on these samples, says the *Canadian Gazette*, "shows that some of the ore is sufficiently rich to suit the requirements of manufacturers in Great Britain, while in the case of other samples it is expected that either by a process of careful selection, or by striking new ground, an ore may be obtained of sufficient richness to be profitably exported. The chromic iron ore occurs in the same districts as the asbestos, which of late years has been so extensively mined. The Quebec Central railway has recently made the deposits much more accessible than formerly. It may be remembered that many years ago a trial shipment, consisting of ten tons of the ore, was made to England, but it was then found to be too poor in chromic oxide to be profitably handled."

The action of coal dust in bringing about colliery explosions, was very clearly explained by Herr Nasse in his address to a recent meeting of German mining engineers at Düsseldorf. From experiments it appears that risk of explosion depends upon four circumstances and conditions, each of which affect the explosiveness of the air in a large degree. These are (1) the quantity and degree of firmness of the dust, circumstances that depend upon the hardness and the structure of the coal; (2) its chemical constitution; (3) the quantity of carbonated hydrogen present; and (4) the degree of moisture in the dust. The last is a matter of great importance, and demands careful attention. It is a variable condition in the same mine; for dust may be very dry in one part of the workings and saturated with moisture in another. Also, the moisture contained in the coal-seam may be much less in one mine, or in one locality, than in another; so that great variations in the dryness of the dust at the working faces may be observed. Generally, the seams that do not reach the surface are much drier than those that crop out. The former usually contain about 4 per cent. of water; the latter, from 9 to 15 per cent. Herr Nasse believes watering to be desirable, and where shot-firing is carried on, necessary. But he admits that practical difficulties have hitherto stopped the way against a general adoption of this precautionary measure. He thinks that the subject should receive more attention from mining engineers.

The following interesting item, on the state of the Nova Scotian coal trade, appears

in a recent issue of the *Canadian Trade Review*. "When we had a reciprocity treaty with the United States, the Americans were the principal purchasers of Nova Scotia coal. In 1865 and 1866, out of an average of 595,000 tons mined, about three-fourths of the entire product went across the border. After the abrogation of the treaty, the American import duty upon bituminous coal of course interfered with the sales to the United States, and gradually those sales have decreased, until last year the Americans took but 34,000 tons, only a thirty-eighth part of the entire product. We then protected our coal miners, and the manufacturing industries. The first movement gave the miners an extended home market, the second increased the consumption and consequently the demand for coal. Now, instead of mining only 595,000 tons annually as in 1886, or 700,000 tons as between 1871 and 1880, the Nova Scotia output had reached 1,352,000 tons, at which it stood in the year 1885. Of this quantity Nova Scotia, owing in part to the increased demand for manufacturing purposes, used 450,000 tons, while New Brunswick took 150,000. The Upper Provinces took 493,000, and the remainder was taken by Prince Edward Island, Newfoundland and the West Indies. The total sales of Nova Scotia coal in 1879 reached 688,624 tons. The total sales in 1885 reached 1,250,000, and the output 1,350,000. Thus the business has doubled since 1879. The total sales to Ontario and Quebec in 1881, two years after the introduction of the National Policy, were 268,000 tons. The total sales to the same provinces in 1885 were 493,000 tons, an increase of not quite one hundred per cent. in five years.

At the present time, writes the *Chicago Mining Review*, there is occasional enquiry concerning the probable exhaustion of our coal, oil and gas fields. The assumption generally being that these supplies were created ages ago, and stored up in reservoirs, in which they are now discovered to meet the requirements of the present time. Some years ago the problem of the future supply of coal assumed large proportions and was considered with much anxiety. The discovery of petroleum and its adaptation to use as fuel, removed and destroyed much of the interest connected with the discussion of the question of supply. As attention was turned to the supply of oil, and its outlines were beginning to be definitely established in the minds of speculative investigators, the value and importance of the wide-spread discoveries of natural gas still farther removed the date of the exhaustion of our fuel supply. At the present time there is much difference of opinion concerning the permanence of the supply of natural gas; many holding that it has been collected in reservoirs, which, when depleted can never be refilled, hence predict a short season of spasmodic activity in the life of this new agent, which is already becoming an important factor in the industrial history and advancement of the present time. As we have stated, much of the difficulty and confusion comes from a lack of definite

knowledge concerning the productive causes or the creative forces which, by their action, gave these important productions as a result and until this can be more positively established and is better understood, all discussions and conclusions in regard to the magnitude or permanence of the supply must be problematical and unsatisfactory. Our own opinion, in regard to this matter, is that the creative forces of nature are ever present and ever active; that the creative period is never ending, and wherever favorable circumstances exist the union of chemical elements, according to established laws and affinities, will unite and produce their diversified product and results.

"Since the days of '49,'" writes an authority, "prospectors have mistaken mica, or 'fool's gold,' for gold itself. Mica, in nature, is very abundant; it is met with in every camp; we are brought face to face with it in every mountain range as its forms are of three constituents of which granite is composed (mica, quartz and felspar). It is also a prominent constituent in granite, gneiss, and mica-schist. We find it again in our soil, formed from the disintegration of the above named rocks. From a mineralogical standpoint, common mica is called 'botite,' which is a magnesia-iron mica, part of the alumina being replaced by sesquioxide of iron, and protoxide of iron and magnesia existing among the protoxide bases. Black is the prevailing color, but brown, green, yellow to white also occur. Prisms, commonly tabular; often in disseminated scales, sometimes in massive aggregations of cleavable scales. The hardness is 2.5 to 3. Now note the specific gravity, which ranges between 2.7 and 3.1; while that of gold raises from 15.5 to 19.5; according to its purity. In countries where mica-schist abounds, yellow mica in the sand is very abundant, and often deceives the eye of the prospector in his search for gold. This silvery and golden mica in scales is the 'cat-silver' and 'cat-gold' of Mediaeval Europe. Others mistake iron and copper pyrites for gold, and arsenical pyrites are mistaken for silver; this last, in fact, is a very common mistake, even in old camps. Gold is sometimes found in a finely divided condition in pyrites, but vast masses, or perhaps it would be better to say mountains, of it in California and Colorado do not carry a trace of gold. Pyrite or bi-sulphuret of iron is very brittle; its hardness is about 6.5, while that of gold is 2.5. It occurs commonly in cubes, usually of a brass color. The cubic faces are often striated, with striations of adjoining faces at right angles. Chalcopyrite is a double sulphurate of copper and iron of a brass-yellow color and metallic lustre; on exposure to moist air it becomes iridescent on its surface. It is easily scratched with a knife, giving a greenish black powder. It is the principal ore of copper at the Cornwall mines. Arsenopyrite or mispickel has a hardness of 5.6, and is very brittle; of a metallic lustre and a silvery-white to steel gray color. This metal occurs in small particles in the partly oxidized ores of this camp, and is very often mistaken for silver. Pyrites, being brittle, are readily reduced to

powder before the blow of the hammer, while gold and silver in their native state will flatten."

As much as the miner may oppose the scientist and the school-taught expert, there is much reason for a larger increase in knowledge in every branch of mineralogy and metallurgy. The history of the loss and waste in connection with mining operations and ore treatment during the past few years, when its immense magnitude is fully comprehended, will not prove to be a very strong support in favor of the methods that have prevailed, or the management and skill of those directing them. Those who more fully comprehend the question, clearly understand that a union of practical and theoretical knowledge is most to be desired, and that neither the theorist and student, or the practical miner or mill man, can afford to ignore the other. Every increment of knowledge, from whatever source, or however gained, is an additional element of power to be used in the accomplishment of any purpose. The wider the range of information, the more comprehensive the understanding, the deeper the insight and investigation, so much better fitted and more valuable is the possessor to accomplish the best results in the most economical manner. It is more than probable that some mistakes and some losses have accrued from the inexperience of scientists and experts, but the mining territory from Alaska to Mexico is covered with the monuments of inexperience and ignorance, erected at a vast expenditure of time and money, by men claiming to be practical. Practically, notwithstanding the wonderful results, the mining territory has been one vast scene of costly experiments; and to-day even the present methods, as great as is their improvement over those of the past, are by no means creditable to the intelligence and advancement of this century, as shown in the activities of every other industry. We stand, as yet, upon the threshold of improvement in this direction, where such methods and appliances prevail that would ruin any other business not so prolific in resources. The bleaching bones of thousands of enterprises lost in this desolate desert, and the stagnation that hangs like a gloom over so many promising localities, the indifference of capital to the most alluring stories of glittering wealth, the languishing camps that appeal in vain for assistance to open the treasure-houses within their limits, all show the uselessness of attempting to proceed by old methods; and the imperative necessity for a wiser management, a more comprehensive knowledge, and the inauguration of new methods in developing the vast mineral resources of our country; which will some day, when these questions are practically met, give results that will astonish and outshine the most flattering and wonderful statements yet recorded in the history of this great industry.—*Chicago Mining Review.*

Miners returning from the Lorne Creek mines, B.C., report a very unfavorable season there owing to the continued high water.

Phosphate Shipments from Montreal for Season of 1886.

Date.	Shippers.	Ship.	Destination.	Tons.
May 22	Wilson & Green ..	S. S. Oxenholme	Liverpool...	387
" 22	Lomer, Rohr & Co	"	"	350
June 5	Wilson & Green ..	Bq. Rhine.....	London.....	220
" 4	"	S. S. Ashton...	Sharpness...	290
" 10	"	Bq. Dictator...	London.....	140
" 11	Lomer, Rohr & Co	S. S. Lake Leman	"	500
" 12	"	S. S. Berbice....	Liverpool...	100
" 19	"	S.S.M. Bedington	London.....	150
" 26	"	Brig. Mose Rose	"	95
" 26	"	S. S. Carmona...	"	400
" 30	Wilson & Green ..	S. S. Benbrac...	Liverpool...	416
July 2	Lomer, Rohr & Co	S. S. Cairo.....	London.....	157
" 7	"	S. S. Oxenholme	Liverpool...	765
" 13	Wilson & Green ..	Bq. M. E. Seed.	"	523
" 13	"	Bq. M. Mitchell	"	150
" 15	Lomer, Rohr & Co	S. S. Benison...	"	260
" 22	"	S. S. Erl King...	London.....	330
" 24	Wilson & Green ..	S. S. Dracona...	Avonmouth...	492
" 30	Lomer, Rohr & Co	S. S. Acton.....	London.....	535
Aug. 4	Wilson & Green ..	S.S. River Judas	Liverpool...	507
" 4	W. M. Knowles...	"	"	189
" 7	Wilson & Green ..	S. S. Juliet.....	London.....	170
" 10	"	S. S. Kehrweider	Hamburg.....	590
" 9	Lomer, Rohr & Co	S. S. Benacre...	Barrow.....	225
" 11	W. M. Knowles...	S. S. Bonhope...	Liverpool...	276
" 12	Lomer, Rohr & Co	S. S. Carmona...	London.....	150
" 14	"	S. S. Crete.....	"	332
" 19	"	S. Princess.....	Liverpool...	310
" 20	"	Bq. Fergerson...	London.....	252
" 20	Wilson & Green ..	S. S. Cononbury.	"	220
" 20	Lomer, Rohr & Co	"	"	230
" 21	"	S. S. Oxenholme	Liverpool...	630
" 26	"	S. S. Plessey...	London.....	480
" 26	"	S. S. Benbrac...	Liverpool...	435
Sept. 1	R. C. Adams.....	Bq. M. C. Smith	Belfast.....	72
" 1	R. C. Adams.....	S. Parthia.....	Liverpool...	253
" 1	Lomer, Rohr & Co	"	"	150
" 1	W. M. Knowles...	"	"	225
" 3	Gillespie & Moffatt	S. S. Emilau...	"	57
" 3	Lomer, Rohr & Co	"	"	100
" 3	Millar & Co.....	"	"	125
" 3	Wilson & Green ..	"	"	260
" 6	Lomer, Rohr & Co	S. S. Dunholme.	London.....	360
" 8	Wilson & Green ..	S. S. Clare.....	"	214
" 18	Lomer, Rohr & Co	S. S. Cotherston.	"	400
" 18	"	S. S. Grafton...	"	235
" 24	"	S. S. Berbice...	Glasgow.....	95
" 29	"	S. S. Fernholme.	London.....	150
Oct. 6	"	S. S. Concordia.	Glasgow.....	215
" 9	"	S. S. Oxenholme	Liverpool...	525
" 9	W. M. Knowles...	"	"	230
" 12	Lomer, Rohr & Co	S.S. Wandraham	Antwerp....	150
" 13	"	S. S. Horton...	London.....	381
" 21	"	S. S. Erl King...	"	190
" 22	Wilson & Green ..	S. S. Phenician.	"	600
" 20	Lomer, Rohr & Co	Bq. G. Metzler.	Belfast.....	95
Nov. 3	"	S. S. Alcides...	Glasgow.....	160
" 3	Wilson & Green ..	"	"	355
" 3	Lomer, Rohr & Co	S.S. Ocean King	London.....	205
" 6	"	S.S. Gothenburg	"	295
" 6	Wilson & Green ..	"	"	325
" 10	Lomer, Rohr & Co	S. S. Baurwall.	Antwerp....	145
" 15	"	S. S. Carmona...	London.....	290
" 17	Wilson & Green ..	S. S. Scotland ..	"	310
" 19	Lomer, Rohr & Co	S. S. Montreal..	Liverpool...	180
" 19	R. C. Adams.....	"	"	205
" 20	Wilson & Green ..	S. S. Invermay..	Sharpness...	180
" 20	Gillespie & Moffatt	"	"	19
Total shipments for 1886				18,972

GROUND IN BAGS.

May 12	W. M. Knowles.....	S. S. Kehweider.....	1,560
Sept. 17	Lomer, Rohr & Co ..	S. S. Scotland	200
Total bags.....			1,760

Iron Among the Ancients.

Iron was first used in Western Asia, the birth-place of the human race, and in the northern parts of Africa, which are near to Asia. The Egyptians, whose existence as a nation probably dates from the second generation after Noah, and whose civilization is the most ancient of which we have any knowledge, were at an early period familiar with the use and manufacture of iron. Iron tools are mentioned by Herodotus as having been used in the construction of the pyramids. In the sepulchres at Thebes and Memphis cities of such great antiquity that their origin is lost, butchers are represented as using tools which antiquarians decide to have been made of iron and steel. Iron sickles are also pictured in the tombs at Memphis, and at Thebes various articles of iron have been found which are preserved by the Historical Society at New York, and are probably three thousand years old. Thothmes the First, who is supposed to have reigned about seventeen centuries before Christ, is said in a long inscription at Karnak, to have received from the chiefs, tributary kings, or all of

sovereigns of lower Egypt, presents of silver and gold, "bars of wrought metal and vessels of copper, and of bronze, and of iron." An expedition which the same king sent against Chadasha, returned bringing among the spoil "iron of the mountains, 40 cubes." Belzoni found an iron sickle under the feet of one of the sphinxes at Karnak, which is supposed to have been placed there at least six hundred years before Christ. A piece of iron was taken from an inner joint of the great pyramid at Gizch in 1837. Both of these relics are in the British Museum. The reference to iron in Deuteronomy, iv, 20, apparently indicates that in the time of Moses, the Egyptians were engaged in its manufacture, and that the Israelites, if they did not make iron for their taskmasters, were, at least, familiar with the art of manufacturing it; "but the Lord hath taken you, and brought you forth out of the iron furnace, even out of Egypt." This expression is repeated in 1st Kings, viii, 51. A small piece of very pure iron was found under the obelisk which was removed in 1880, from Alexandria to New York. The country which lies to the south of Egypt is supposed to have produced iron in large quantities in prehistoric times. Iron was known to the Chaldeans, Babylonians, and the Assyrians, who were contemporaries of the early Egyptians. Some writers suppose that the Egyptians derived their supply of iron principally from these Asiatic neighbors, and from the Arabians. Among the articles discovered by Layard, at Nineveh, were iron scales of armour from two to three inches in length. He also found a perfect helmet of iron, inlaid with copper bands. The Old Testament teems with incidents in which iron is mentioned. In the wanderings of the children of Israel, iron is frequently mentioned. When they smote the King of Bashan, they found him within an iron bedstead. Canaan, the land of promise, is described in Deuteronomy as "a land whose stones are iron." The Medes and Persians, India, and China, and other eastern countries appear to have been acquainted with its manufacture from a very early period. It is worthy of mention that the mythologies of both Greece and Rome attributed the invention of the art of manufacturing iron, to the gods, a fact which of itself may be regarded as establishing the great antiquity of the art in both centuries. Homer, who is supposed to have lived about 850 years before the Christian era, and, therefore, before the era of authentic Grecian history, makes frequent mention of it in his poems. Some of the swords and javelins of the Romans were made of iron and steel in fourth century before the Christian era, but their agricultural implements, were made of iron at an earlier period. The Romans used a battering ram, which had a head of iron, at the siege of Syracuse, in the year 213 before Christ. In the Acts of the Apostles, a statement is made which indicates that iron was used at this period for architectural purposes, "when they were past the first and the second ward they came unto the iron gate that leadeth into the city." Pliny says that iron ores are to be found almost everywhere. Iron has also been found in the ruins of Pompeii, about the time the Coliseum was built.

New Jersey Cedar Mines.

Among the strange productions of Cape May are the "Cedar Mines"—swamps of dark miry stuff, in which are buried immense trees of White Cedar, *Cypressus Thyoides* of the botanists. These mines contain enormous trees buried to a depth varying from three to 10 feet. The logs lie one across the other, and there is abundant evi-

dence to show that they are the growth of different successive forests. Indeed in these very swamps forests of the same trees are now growing. The miners become very skillful at their work. An iron rod is thrust into the soft mud, over which often the water lies. In striking a buried tree, the workman will by several soundings, at last tell how it lies, which is its root end, and how thick it is. He then manages to get a chip off the tree, and by its smell determines at once whether it is worth the labor of mining—that is, the workman will tell unerringly whether the tree be a *windfall* or a *breakdown*. If a breakdown, it was so because it was decayed when standing; if a windfall, the tree fell while sound, and has been preserved ever since by the antiseptic nature of the peat marsh in which it was buried. The soft earth is then removed. This makes a pit in the swamps. Into this the water soon flows and fills up. The saw is now introduced, and at regular intervals a cut is made through the tree. It is curious that the log of a sound tree will sure to turn over when it floats up, the lower side thus becomes uppermost. Trees in this way are sometimes obtained, which yield 10,000 shingles worth \$20 per thousand, thus one tree will yield \$200. The age of many such trees, as the season rings have been counted, has been made out to be from ten to twelve hundred years, and even more. A layer of such trees is often found covered by another layer, and these again by another, and even a third, while even living trees may still be growing over all. It is evident, indeed, that New Jersey has experienced what the geologists call "osilations." Cape May contains abundant evidence of having been lifted out of a modern sea. The recent oyster and clam are found in natural beds, just as they did in the ocean, but now in positions many feet higher than the contiguous oyster beds; while buried trees exist at depths lower than the beds of mollusks.

PROSPECTING.

Indications that will Facilitate the Search for Minerals.

(SELECTED.)

The search for minerals in any given district should not be undertaken unless there is some previous indication as a reason for it; because, save the most ordinary building materials, the mineral substances to which the art of mining is applied are sparingly distributed in nature; and in any given point of the earth's surface we are authorized to suppose *a priori* that these substances do not exist.

More or less proximate indications of their existence may be deduced:

- 1st. From a knowledge of the geological structure of the country.
- 2nd. From the presence at the surface of the ground of fragments of veinstone or of ore.
- 3rd. From the presence of the outcrops.

It is advisable to give a few details on the value which should be attached to each of those indications.

The geological structure of the ground sometimes furnishes *positive*, sometimes *negative* indications.

It is evident, for instance, that the existence of an igneous rock, such as granite, shuts out the possibility of there being coal *at the same point*; but this conclusion only holds good *for the very point under consideration*; and it is known, for instance, that a large number of more or less developed coal mines in France are scattered over the primitive central plateau, and thus rest either upon granite itself or upon such ancient

rocks as gneiss or mica-schist. As an example of a *positive indication* it may be said, on the contrary, the presence of the *Coal Measures, properly so-called*, may fairly lead us to suppose that coal is present also. It is rare, in fact, unless in the case of a mere insignificant patch of the rocks, that the coal measures do not contain some workable seam of coal, and we have seen from the examples of the Belgian coalfields that they sometimes contain a very large number. It may also be said that the existence of Permian rocks may lead us to conjecture the presence of copper; that of the Trias, and more especially of the variegated Marls, the presence of rock salt (at all events in the north east of France); that of the supraliassic Marls the proximity of iron ore.

The presence at the surface of the ground of fragments of useful substances (shoad-stones), or even of sterile, substances known to be often associated with the first, is an indication which deserves to attract attention. In prospecting a country, an examination should be made of all denuded parts, escarpments, sides of valleys, etc., and particularly of ravines and beds of the different water courses. Standing in the bed of a torrent we find everywhere, in some measure, a collection of mineralogical specimens derived from all the region higher up. Each mineral species has its own value from the point of view under consideration. Among rocks consisting of mica-schist, for instance, we shall attach very little importance to fragments of quartz with a simply resinous or even saccharine fracture, as this substance frequently occurs interposed in reiform lumps between the folia of the schist. Well crystallised quartz will deserve more attention. Substances that are foreign to the composition of the rock and known to be pretty commonly veinstones of lodes, such as calc-spar, fluor spar, harytes, etc., will deserve still more attention. The same thing will be the case *à fortiori*, if spots of pyrites, or galena, or any traces of a green coloring due to the decomposition of copper ore, etc., are found on breaking these fragments.

In carrying out observations of this kind it is necessary to ascend the beds of the torrents step by step, examining the sand and pebbles carefully and minutely in order to ascertain how high up the fragments which awakened attention by their special nature, are found, and thus to discover the point whence they are derived. An idea of the distance of this point may be formed from the more or less rounded shape of the fragments, due consideration being paid to their hardness. When this point has been discovered it will only remain to examine whether the substances noticed have a purely adventitious character of the rock, or whether they belong to a deposit apparently of some extent. This verification is quite essential, for the first case is perhaps that which presents itself most frequently to the observer.

Mineral springs furnish us with indications with regard to soluble substances, analogous to those obtained from fragments of rock concerning insoluble substances. It is thus that brine springs, or springs charged with chloride of sodium, have led to the discovery in the east of France, and especially in the department of Mewithe, of thick beds of rock salt, which are being actively worked at the present day.

If by direct observation, or by proceeding in the manner described in the preceeding paragraphs, we have ascertained the presence of an outcrop, this outcrop should be made the subject of a special examination. As the lode is of a *different nature* to the enclosing rocks and has been exposed to the *action of the same atmospheric agents*, it will not have resisted in the

same way. It will often appear at the surface, either as a hollow or in relief, according as its hardness is greater or less, than that of the enclosing rocks. It is in this manner that hard quartz ore lodes are seen standing out above the surface of the ground in the form of prominent walls, many feet high, running sometimes for a distance of several hundred yards. These outcrops are a certain indication of the presence of a lode; but as a rule they do not give any information about its richness, since the metallic substances have generally been oxidized and removed in the state of soluble salts, often leaving behind nothing but an ochreous precipitate, from the amount of which, in certain cases, may be inferred the quantity of certain metallic sulphides, such as iron or copper pyrites, which the deposit originally contained. This ochreous precipitate itself is often absent, and the outcrop only shows by a slight accidental discoloration any sign of its original richness in ore. Even if an outcrop contains no ore whatever, it is still worthy of investigation if it exhibits a certain continuous character. Therefore, the first care, after having hit upon some point of an outcrop, should be to make sure whether this continuity exists. In case it is not apparent at the surface, a few pits may be sunk to endeavor to ascertain the strike and dip of the deposit and to infer from these, allowing for the outline of the ground, the approximate position of the line of outcrop. This line should be staked out, and efforts should be made to discover other points of the outcrop by digging trenches at intervals at right angles to its presumed strike, and then down till rock in place is met with. When at least three points of the outcrop, not very far apart, and situated at different levels, have been determined in this way, a plane passing through these three points, in case of a lode or bed, may be taken provisionally, on account of possible disturbances of the deposit between these three points, as representing the position of the deposit of the bosom of the earth; it will also serve as a basis for settling upon the best manner of exploring the deposit in depth. If it is a massive deposit with two comparable horizontal dimensions the preliminary excavations should be carried on so as to circumscribe it in every way.

BOOK NOTICES.

The veteran chemist and mineralogist, Dr. T. Sterry Hunt, presents as Chapter VIII, of his *Mineral Physiology and Physiography* (a second series of "Chemical and Geological Essays," a treatise on *A Natural System of Mineralogy, with a Classification of Native Silicates*. This treatise has been published in full in the *Transactions* of the Royal Society of Canada, and in abstracts more or less extended in other places. We cannot undertake, within the limits of an article, to give it an adequate critical examination. The best that we can hope to do is to impart to our readers a general notion of its contents.

The essay is in three parts. In the first, which is an historical introduction, the author outlines the systems of classification in the mineral kingdom proposed by Werner, Mohs, Dana, Berzelius, Rammelsberg, and others, and shows that the "natural history" systems of Werner and Mohs (followed with more or less modification by Haidinger, Jameson, Shepard, and, in his earlier editions, Dana) were founded on external characters, such as hardness, specific gravity,

and crystalline form, independent of composition, as revealed by chemical analysis. Students of mineralogy under the eminent teachers of the last generation will remember that they taught determinative mineralogy without recourse to chemistry, and even looked upon the blow-pipe as almost an evil—a thing which the metallurgist might need, but the mineralogist had better do without, save in the last resort. We can bear witness to such a feeling in the case of the venerable Breithaupt, the successor of Mohs at Freiberg; and under his successor, Weisbach, it has not ceased to exist.

Indeed, for certain purposes of instruction, it is the right feeling. Determinative mineralogy should be so taught that the student may become able, in the great majority of instances, to recognise minerals from their physical characters. And since the practical field-mineralogist has more to do with determinative than with analytic mineralogy, it is natural that he should retain the tendency received at school, and that he should become more familiar with hardness, streak, and crystalline than with molecular equivalents. Moreover, the mineralogist is usually a collector, and, as Dr. Hunt acutely remarks, the divorce between physical and chemical characters maintained in the study of mineral species by Werner, Mohs, and their followers, produced a system available for the purposes of determination without the destruction of the individual specimen. The artificial system of Linnæus in botany possessed the same advantage; and that it is for many purposes a practical advantage, the tenacious life of that system, in spite of its scientific absurdity, bears witness. The same will probably continue to be the case with the mineralogical systems which science has more or less outgrown. They will survive in tables and in practice, long after they are shown to be less truly natural than those which take into account the chemical analysis as of paramount importance.

There is, in fact, a general consent among mineralogists that the chemical system, proposed by Berzelius, and perfected by Rammelsberg, Naumann, Dana, and others, presents the truly natural classification. Hardness, specific gravity, crystalline form, optical characters, etc., are rated as secondary in value, and important chiefly as means of determination. But this is to go to the other extreme. A truly natural system should be based on both physical and chemical grounds—if such a thing be possible; and possible it can become only when, to use Dr. Hunt's words, "inherent and necessary relations between the physical characters and the chemical constitution of inorganic bodies" are made known. That such relations exist, our author declares; and in this essay he seeks to establish at least some of them.

The second part of the paper before us reviews at some length the author's progressive treatment of this subject since 1853, when he first declared the possibility of a physico-chemical classification. We shall not follow this review in detail, but content ourselves with quoting from a paper published in 1867, the following admirable statement of guiding principles:

"In approaching this great problem of classification, we have to examine, first, the physical conditions and relations of each species, considered with relation to gravity, cohesion, light, heat, electricity, and magnetism; secondly, the chemical history of the species, in which are to be considered its nature, as elemental or compound, its chemical relation to other species, and these relations as modified by physical conditions and forces. The quantitative relation of one mineral (chemical) species to another is its equivalent weight, and the chemical species, until it

attains to individuality in the crystal, is essentially quantitative. It is from all the above data, which would include the whole physical and chemical history of inorganic bodies, that a natural system of mineralogical classification is to be built up. . . . The variable relations to space of the empirical equivalents of non-gaseous species, or, in other words, the varying equivalent volumes (obtained by dividing their empirical equivalent weights by their specific gravity) show that there exist in different species very unlike degrees of condensation. At the same time, we are led to the conclusion that the molecular constitution of gems, spars, and ores is such that those bodies must be represented by formulas not less complex, and with equivalent weights far more elevated, than those usually assigned to the polycyanides, the alkaloids, and the proximate principles of plants."

Following the line thus indicated, Dr. Hunt began by seeking to find in the realm of inorganic chemistry the laws progressive or homologous series and polymerism, already recognized in the chemistry of the hydrocarbons. Already in 1853, he had suggested that "all species crystallizing in the same shape have the same equivalent volume, so that their equivalent weights (as in the case of vapors) are directly as their densities, and the equivalents of similar species are as much more elevated than those of the carbon series as the specific gravities are higher." And this suggestion he had illustrated with instances drawn chiefly from the carbonate spars and the polysilicates. In these and later essays in the same direction, Dr. Hunt indicated, as the principal evidence and measure of the connection between the chemical and the physical characters of species, *the relation of equivalent weight to specific gravity*.

The complete statement of the principles adopted as a basis of classification is now given substantially as follows:

1. The extension to all mineral compounds of the conception of high equivalent or molecular weights like those of the carbon series in so-called organic chemistry.
2. The similar extension of the laws of progressive or homologous series.
3. The attribution of minor variations in the chemical composition of a mineral species not only to its polybasic character (that is, to the replacement of one base by another in varying degrees), but also in certain cases to indefinite admixtures of homœomorphous species.
4. The assumption that for homœomorphous solids, and probably for all solids, the molecular volumes are identical; and the attempt to fix the molecular weights of such compounds as the polysilicates and polycarbonates from their densities, as compared with those of species the minimum molecular weights of which are otherwise determined.
5. The adoption of atomic formulas to represent the composition of mineral species, and the comparison of the volumes of complex species by means of numbers deduced from these formulas. The term *atomic* here used, is distinguished from *molecular*; and Dr. Hunt's atomic weights are derived from the ordinary chemical equivalents, or molecular weights, by multiplying the latter by the numbers representing the atomicities of the respective elements. His symbols are distinguished by the use of small letters instead of capitals. Thus, for the monad elements like sodium, chlorine, and fluorine, the atomic symbols represent the same numbers as the received molecular weights: $\text{Na} = \text{na} = 23$; $\text{Cl} = \text{cl} = 35.5$; etc. For dyad elements, like oxygen, calcium, and ferrosium (that is, iron in ferrous salts), the molecular weights are divided by 2

O = 16, o = 8. Ca = 40, ca = 20; Fe = 56, fe = 28. For triads, like aluminium, boron, and ferricum (iron in ferric salts), the divisor is 3: Al = 27, al = 9; B = 11, b = 3.66; Fe = 56, fi = 18.66. For tetrads, like silicon and titanium, the divisor is 4: Si = 28, si = 7; Ti = 50, ti = 12.5. Finally, the pentad, niobium, requires 5 as divisor: Nb = 94, nb = 18.8.

Employing these weights, Dr. Hunt translates the empirical formulas of the received notation into atomic formulas, and these formulas he affects with a modulus or multiplier, to represent the law of polymerism. Thus, the formula of lime-magnesia pyroxene given in Dana's text-book is $\text{CaMgSi}_2\text{O}_6$. Calcium, magnesium, and oxygen, being dyads, and silicon a tetrad, the atomic formula for this variety would be $\text{ca}_2\text{mg}_2\text{si}_4\text{o}_{12}$, or, using the symbol m to represent the interchangeable metallic elements, $m_4\text{si}_4\text{o}_{12}$. This is the same in proportion as $m_2\text{si}_2\text{o}_6$; while, as to the molecular weight of the body as a whole, that is, of the species, it can not be determined from an empirical formula derived solely from chemical analysis. It must be either the weight directly shown by the formula, or some multiple of it; that is all we can say so far. Hence, the general atomic formula for the *molecular weight* of pyroxene is written by Dr. Hunt $n(\text{si}_2\text{m}_2\text{o}_6)$, n being the undetermined multiplier. But it is not necessary to know the value of n in order to obtain a number representing the volume of the atomic unit. In the case taken for illustration, the empirical atomic formula $\text{si}_2\text{m}_2\text{o}_6$, in which the one atom of m is one half ca and one half mg ; we have a total weight of $(2 \times 7) + (0.5 \times 20) + (0.5 \times 12) + 3(8) = 54$. Dividing this by 3, the number of oxygen atoms, we have 18, which represents the weight of the atomic unit of the species, this atomic unit in this case being an oxide. For other combinations than silicates, this atomic weight (the general symbol for which is P) is obtained in a slightly different manner, which we will not here stop to consider. P , being once obtained, is divided by D , the ascertained specific gravity of the species (water = 1.), and the quotient, V , is a number representing the volume of the atomic unit.

5. The fifth principle is that, in related and homologous species, the hardness and the chemical indifference are inversely as the value of V —or, in other words, that they increase with the condensation which has attended the chemical combination. This, we presume, is a sort of check on the foregoing assumptions and calculations. If the values of V are really more closely connected with the characters of hardness and indifference than are the values of D ; that is to say, if, by manipulation of the atomic formula after Dr. Hunt's fashion, a series of numbers can be obtained which will tell us more, or tell it more accurately, than the simple series representing specific gravities, then the introduction of chemical elements into the calculation is more or less perfectly vindicated. Otherwise, we might just as well throw it all away (so far as this use is concerned), and content ourselves with the simple old notion that among similar minerals hardness and chemical indifference vary as the specific gravity.

It is difficult to apply a precise test in this case; for we have no numerical measure of chemical indifference, and only a very loose and vague measure of hardness. A casual inspection of Dr. Hunt's tables of the silicates shows that P does not vary greatly among nearly allied min-

erals, and hence that $\frac{P}{D}$ varies on the whole inversely as D .

The third part of the essay presents a classifi-

cation of silicates. Here, the first division is on chemical lines. According as the minerals contain protoxide bases, sesquioxide bases, or both, the order Silicate is divided into three sub-orders: Protosilicate, Protopersilicate, and Persilicate. An ingenious and forcible argument is offered, to show that this division is really fundamental in nature—that it lies in the the processes of mineral genesis and sub-aërial decay. In each of these sub-orders, five "tribes" are distinguished on physical and chemical grounds, which correspond in a general way, though not precisely, to the classes of spars, gems, and micas established by Mohs, with the addition of a separate class of amorphous or colloid species, and a further division of the spars into hydrous and anhydrous. The five tribes of Dr. Hunt thus become Hydrospathoid, Spathoid, Adamantoid, Phylloid, and Colloid; and the sub-order is indicated by the appropriate prefix. Thus, we have under the Protopersilicates, Hydroprotopersilathoids, Protopersilathoids, etc.; under the Protopersilicates, Hydroprotopersilathoids, Protopersilathoids, etc. The longest of these names are replaced in practice by others, referring to typical species. Thus, the Hydroprotopersilathoids are Zeolitoids, comprising the zeolites which do not contain persalts exclusively. The latter (Perzeolithoids) constitute the Hydropsilathoid tribe of the Persilicate order.

Compared with the reigning system of classification; as found in Dana's text-book, this is apparently more symmetrical, logical, and comprehensive. The fundamental division of the former is based on the presence or absence of combined water; and the next rank of subdivision, namely, into bisilicates, unsilicates, and subsilicates, involves a chemical distinction only—a distinction, moreover, which becomes somewhat hazy among the hydrous silicates, which are divided into a "general" section, a "zeolite" section, and a "margarophyllite" section. Of course, minerals of very different physical characters are thrown together under this purely chemical classification.

Another scientific advantage in Dr. Hunt's method is, that it is independent of complicated theories as to the arrangement and relations of the atoms or the molecules in chemical combination. The terms *atom* and *molecule*, as employed by him, represent imaginary units, and do not involve the hypothesis of hard particles with void spaces, of bonds and links, to explain chemical affinities. Whether such be or be not the actual constitution of inorganic bodies, is a question which does not affect the relations he has sought to establish.

We have no space to consider his brief suggestion of a scheme covering all mineral species, or his striking discussion of the question of molecular weights. In the latter field, indeed, we feel both least inclined to adopt, and least competent to criticise, his conclusions. Their correctness does not seem to be necessarily implied in his classification of the silicates.—*Engineering and Mining Journal*.

"Mr. Charles Marvin," writes a prominent English authority, "whose name of late years has, by reason of his writings on Russian affairs, become very familiar to the public, sends us a pamphlet, 'The Coming Deluge of Russian Petroleum.' On this occasion Mr. Marvin writes on a commercial subject, and he has put together a number of astounding facts as to the wealth of the petroleum springs of Baku. He tells us at the outset that a single well in Russia yields daily more petroleum than all the other oil wells in the world combined, and there are

25,000 wells in America. Three years since a well was reported at Baku to be spouting 3,400 tons of petroleum daily, and the world wondered; but Mr. Marvin tells us that this autumn one well has been spouting 11,000 tons of petroleum daily. The object of Mr. Marvin is to again call the attention of English capitalists to the rich field for enterprise in the development of these Russian oil wells. Development is hardly the word applicable to the wells, for they have a manner of developing themselves, and inundating the surrounding district with oil. Mr. Marvin told of the vast extent and practically inexhaustible character of the wells some years since, but he complains that British capitalists have not come forward to claim their share of the trade. There are 120 firms at Baku having oil refineries and they produced nearly 120 million gallons of refined petroleum. Eight years ago the output was but one and a quarter million gallons, and this marvellous development is attributed to improved means of transport. Formerly the oil had to be barrelled on the spot. In 1879, a steamer fitted with oil tanks for conveying petroleum in bulk commenced working on the Caspian sea, and now there are upwards of 100 Russian steamers carrying on the trade. Mr. Marvin explains that the Baku crude petroleum yields, but 30 per cent of "lamp oil," as compared with 70 per cent. in America, but 60 per cent. of the residue called *astalki* can be treated to yield valuable products particularly for lubricating purposes. One well-known London firm Sir Charles Price & Co., is regularly receiving large shipments of this residue, and it is asserted that lubricating oil made from it is of extraordinary quality. As the price at Baku ranges from 4d. to 1s. 4d. per ton, there must be plenty of money to be made in this branch of the trade. Nearly $3\frac{1}{2}$ million gallons of lubricating oil were sent from Baku up the Volga last year, and upwards of $2\frac{1}{2}$ million gallons were despatched by the Batoum railway. Owing to the low cost of the oil refuse it is being largely used for steam generation in the steamers running from Batoum to Odessa; the Russian fleet on the Caspian has used nothing else since 1874; and the Black Sea Company, owning 76 steamships, will shortly adopt it exclusively. Messrs. Rothchild are largely interested in the trade, and to facilitate transport have placed 250 tank cars on the Transcaucasian Railway. By this line 80,000 tons of managene ore were carried from the Caucasus last year. Mr. Marvin proves that the great need of the district is a cheap means of bringing the oil to a shipping port. Messrs. Rothschild have applied for a concession to construct a pipe line from Baku to Poti or Batoum, six hundred miles; but they have been refused because they are working oil refineries, and the Russian government stipulates that the pipe line shall be controlled by a company not interested in the advancement of any particular refinery. The estimated cost of the pipe line is £2,000,000, and already at least one English firm has sent representatives to Baku and Batoum to investigate the scheme, and examine into the work necessary. Two of the directors of Messrs. John Russell and Co., limited, of Walsall and Wednesbury, were out last year, and Mr. Marvin states that a representative of the firm is now on the spot. Quite apart from the illuminating oils, the Baku oil wells seem likely to have an important bearing on the "liquid fuel" question which is now being discussed by some of our scientific societies. As to the permanency of the Caucasian oil wells. Mr. Marvin says that the oil bearing character of the district was known 2,500 years ago, and oil has probably been flowing on uninterruptedly ever since.

Mineral Products of the United States.

Advance sheets of the report of the United States Geological Survey have just been received, which show the total production of minerals in this country during 1885, as compared with previous years. Of the metallic minerals produced pig iron appears to have been the most valuable in total production, and platinum appears to have been the scarcest. The total production of pig iron in 1885 was 4,045,525 long tons, valued at \$64,712,400 against 4,097,863 tons valued at \$73,761,624 in 1884. The total consumption of iron ore was placed at 7,990,786 tons, of which only 390,786 tons were imported. Silver was next to iron in total production, being 39,910,279 ounces, of a coining value of \$51,600,000, against 37,774,605 ounces in 1884, valued at \$48,800,000. The total gold production was 1,538,376 ounces, valued at \$31,801,000 against 1,489,949 ounces, valued at \$30,800,000 in 1884. Copper showed a slight increase over the preceding year, as 170,962,617 pounds, valued at \$18,292,999 in New York, were produced in 1885, against 147,805,407 pounds valued at \$18,106,162 in 1884. Lead was produced to the extent of 129,412 short tons, valued at \$10,469,431, against 139,897 tons in 1884, valued at \$10,537,042. The quantity of zinc mined showed an increase, 40,688 short ton, valued at \$3,539,856, being produced in 1885, against 38,544 tons, valued at \$3,422,707 in 1884. The valuations above given for copper, lead and zinc are those current at New York. The quicksilver production was valued at San Francisco at \$979,189, against \$936,327 the year before, and the production was 32,073 flasks, against 31,913 flasks in 1884. The production of nickle was much heavier than in 1884, as 277,904 pounds, valued at \$191,753, were mined in 1885, against 64,550 pounds, valued at \$48,412 in 1884. Crude platinum was produced to the extent of 250 troy ounces, valued at (New York) at \$187, against 150 ounces valued at \$450 in 1884. Aluminum was produced to the amount of 3,400 troy ounces, valued at Philadelphia at \$2,550 against 1,800 ounces, valued at \$1,350 in 1884. Of the non-metallic minerals, coal was the most important production, the yield of all kinds of this fuel being 99,969,216 long tons, valued at \$159,019,596, against 106,906,295 tons, valued at \$143,768,578, in 1884. It will be seen from the above figures that while the total production of coal fell off 7,837,079 tons, the value increased \$15,251,018, showing an average increase in price of 25c per ton. The above figures include the colliery consumption. The bituminous coal produced amounted to 64,840,668 tons, valued at \$82,347,648, against 73,730,539 tons, valued at \$77,417,066, while of anthracite 34,228,548 tons were mined, valued at \$76,671,948 against 33,175,756 tons, valued at \$66,351,512 in 1884. Of petroleum 21,842,041 barrels, valued at \$19,193,694 were produced, against 24,089,758 barrels, valued \$20,476,294 in 1884. Lime was an important production, 40,000,000 barrels, valued at \$20,000,000, being made in 1885, against 37,000,000 barrels, valued at \$18,500,000 in 1884. The salt industry was also an important one, 7,038,653 barrels, valued at \$4,825,345, being made in 1885, against 6,514,937 barrels, valued at \$4,197,734 in 1884. The production of building stone was about the same as in 1884, the total value being \$19,000,000. It is worthy of note that 200 tons of "block tin" ore were mined in 1885 at the Etta mine in Dakota. The total value of all the mineral products of the United States in 1885 was \$428,511,356, against \$413,214,748 in 1884. Of this the value of the metallic products was placed at \$181,589,365,

against \$186,414,074 in 1884, while the non-metallic products were valued at \$239,431,991 in 1885, against \$219,800,674 in 1884.

Dishonesty and incompetency, writes the *Critic*, have done much to throw discredit on mining, and this distrust will hardly be removed until our leading business men take hold of it and give mining the position it deserves. A few of our merchants dabble in mines, but their money is too often invested secretly and through the agency of some "cute" operator, who often is an adept in all the practices that throw discredit on mining. They shut their eyes and open their mouths, and receive their share of the profits, with no desire to know the details of the transaction, which they easily surmise cannot bear an honest investigation. "There is nothing like a mining speculation to bring the dirt out of a man," said a leading barrister of our city, and the remark is unfortunately too true. Men who would shrink from the slightest suspicion of dishonesty in their usual business transactions, seem to think that, like in love and war, all is fair in mining. The manipulator of a clever mining swindle who spends his money freely, and jokes openly at the expense of his dupes, is pronounced "a jolly good fellow," while his victims are condemned for their folly in going into a mining speculation. While swindlers in any other business would be forced into court, the mining swindler generally goes free, and his immunity from punishment encourages scores of imitators, who flood the market with worthless schemes. These men are the curse of honest miners, who see capital enlisted in puffed and worthless mines, while their modest statements of facts are passed over. We would echo and re-echo these sentiments.

MINING NOTES

Nova Scotia.

An interesting exhibit from the recently discovered deposits of copper and iron ore in North Sydney was on view during the last weeks of the Colonial and Indian Exhibition.

From the *Canadian Gazette* we learn that: "A company in England has, within the last few days, made arrangements with the owners of a number of the Nova Scotian gold mines for the purchase of their 'tailings.' These will be concentrated in Nova Scotia to a certain richness and then shipped to England for further treatment. The Company has had a number of essays of the 'tailings' made, and has found that they contain quite enough gold to warrant treatment in this way."

The owners of the Carlton gold mine, Yarmouth county, have decided to place a Wiswell Crusher to be run by water power, and have made a contract for the erection of steam hoisting and pumping machinery on their property. The lead has been opened in three places in a distance of 750 feet and the ore has been found equally rich in each shaft.

An exchange reports the sanitary condition of Springhill as deplorable, the water bad, and epidemic diseases very prevalent. A great many accidents, some of them fatal, have recently occurred at these coal mines.

The Clementsport *Courier* announces the discovery of gold by prospectors at a place about five miles from that town. Specimens shown to a *Courier* representative are said to indicate a rich find.

Mr. A. A. Hayward, has purchased the Cochrane Hill property, located about eleven miles from Sherbrooke, Enysboro' County. The property, which was sold by the Sheriff, contains a fifteen stamp mill, large boilers, and is also well equipped with hoisting and mining gear.

The same gentleman is also the proprietor of Empress Mine, where he is meeting with great success. The following particulars of the work being done there are gleaned from the *Critic*: "The main shaft is now down to a depth of 320 feet, and as soon as the large plunger pump, which is now being put up, is in working order, it (the main shaft) will be rapidly sunk upon. There is now over 76,000 feet of stoping ground open, and ore enough at hand to last a 15 stamp mill two years. All the latest labor-saving appliances have been introduced into the mine, and the mining is conducted on scientific principles, guided by great practical experience. No. 5 shaft to the north of the main shaft, has been sunk to a depth of 200 feet and connected with the main shaft and shaft No. 2 by two cross cuts, one at 100 and the other at 200 feet in depth. Good pay ore has been found in the cross cuts and shafts. The Harding mine averaging 71 ²/₃ cents a foot. Shaft No. 5 and drifts to the north, averaging \$1.50 per foot. Shaft No. 3, 52 ¹/₄ cents, and No. 2 level west from shaft No. 3, 50 cents per foot. Overhead stoping is the rule, the detached ore dropping by its own gravity into receptacles, from which it is loaded on the ore cars and raised to the surface without handling. At the surface the ore is dumped automatically, and is soon being crushed under the ponderous stamps of the mill."

We learn that as a result of enquiries made at the Colonial Exhibition, regarding the exhibits of briquettes, a prominent English consulting engineer has been placed in communication with Cape Breton manufacturers, and if sufficient slack coal can be obtained at the different collieries of the province, there seems to be good prospects of extensive works for the manufacture of this fuel being erected there. These briquettes contain about nine per cent. of coal tar pitch, and are said to be admirably adapted for steam purposes, particularly for locomotives.

We learn from the *Engineering and Mining Journal*, that negotiations are in progress at Halifax between the representatives of a New York company and John Grenier for the purchase from the latter of two coal and copper mining properties in Cape Breton; \$200,000 is asked. The copper areas begin at George River Mountain, and extend westerly ten miles along the southern side of Little Bras d'Or, being divided into four blocks of five square miles. The coal areas cover fourteen square miles, and are situated between Lingan and Sydney, near the General Mining Association's property.

The *Critic* is our authority for the following item from the Oldham district: "Mr. E. C. McDonnell brought into town a brick of 140 ozs. of gold, the product of 65 tons of quartz, being the result of six weeks' work by 20 men. The ore was taken from the Dumbrack lead, which averages about six inches in thickness, and was mined from a tunnel at the depth of 250 feet. The main shaft has reached a depth of 315 feet,

the quality of the ore steadily improving as the lead is sunk upon. Mr. McDonnell has been mining for over 23 years, 14 of them on his own account, and has probably paid as much money in royalties as any mines in the Province. The mine is equipped with one of Mumford's patent boilers and a good hoisting engine, and has proved a most profitable investment for its owner."

Quebec.

The phosphate property at High Falls has been sold by its owner, Captain Bowie, for \$10,000.

Mica is reported to have been discovered on the property of Mr. Lemires at St. Ambroise de Kildares.

Dr. C. Le Neve Foster, H. M., Inspector of Mines for North Wales, who was appointed by the Royal Commission to report upon the minerals and rocks shown at the Colonial Exhibition, has expressed a most favourable opinion of the slate exhibited by the Rockland Slate Co. of Montreal. This gentleman has had under his supervision many of the celebrated Welsh slate quarries and he states that although the slate exhibited does not split as smoothly as the Welsh slates, and therefore does not look as well in a rough state, it is fully equal to the best Welsh slate when planed or otherwise worked. The slabs exhibited by the company are very large and the slate is free from iron pyrites, which are often present in the Welsh slates, and by its decomposition, stains them with spots of iron rust. Dr. Foster, like a number of other gentlemen interested in the slate business who have visited the Canadian section, spoke very highly of the manner in which the slate washtubs sent from Montreal were put together, and thinks that the slate workers of Wales might, in this manner, very profitably take a lesson from their Canadian brethren.

Ontario.

Specimens of copper from the deposits at Sudbury were forwarded to the Colonial and Indian Exhibition.

Copper from this mine is being shipped at the rate of ten cars per week to the smelting works in New Jersey.

The rush of miners and speculators into Sudbury has become so great that prices for food and lodging at that place are exorbitant.

The C.P.R. have constructed a side track from the Algoma branch into the portion of the newly discovered copper mines at Sudbury. They are also laying for the owners of the mines another branch to run to a point at the mines about four miles distant.

THUNDER BAY DISTRICT.

The Silver Mountain mine has been sold to an English company for \$175,000. Work will be commenced at once under the supervision of Mr J. Tretheway. The chairman of the new company is Mr. J. A. Tobin, a director of the Liverpool, London & Globe Insurance Co., and on the board of management is the name of Sir Alex. Galt. The capital is placed at \$500,000, all paid up, and it is stated that fully \$200,000 will be available at once for working expenses. The property was purchased from Messrs. Oliver Dounais, J. Tretheway, R. Tretheway and J. Gifford. The vein, which is located on locations R53, R54, was discovered by an Indian in September, 1884.

In addition to the east end of Silver Mountain the Port Arthur *Sentinel* advises that the company have purchased other mining locations as well as about one thousand acres of land from the Ontario government, so that they now control absolutely over fifteen hundred acres, all of which they expect to use in the development of their mine. Two of the locations purchased from private parties cost the original owners about \$100 each, and were purchased by the company for \$1,000 and \$2,000 cash respectively, after being held only about a year.

The Silver Islet mine is to be pumped out, with a view to again working it.

It is not improbable that work will be suspended for the winter at the Peerless mine.

Valuable silver veins are reported to have been discovered on Arrow Lake, a few miles from Whitefish.

Rice leaf silver is reported to have been struck at the Elgin mine. This property is located near the Beaver mine, and is on the same range.

A fourteen foot shaft has been sunk at the Elgin mine. Four men are working the claim and the indications are said to be good.

Mr. C. J. Johnson has taken patents for a large tract of land some 35 miles east of Port Arthur which is said to contain rich deposits of silver lead.

Operations are temporarily suspended on account of the water at the Silver Falls property. After the water has been pumped out work will be resumed.

Iron is said to have been discovered a short distance west of Lac des Mille Lacs. An exchange informs us that negotiations are now in progress with a Chicago company to operate this deposit.

Writing of these and other iron ore deposits in the Thunder Bay District the *Miner* says:

"We believe that we have some of the largest deposits of iron of any district in America; and if this is the case, we have no fear that we shall be able to find a market for it; for the vast consumption, and rapidly increasing demand for the products of iron ore in the United States, places us in such an advantageous position, that it will become almost imperative that the United States draw their principal supply from us. It is almost pretty generally known that unlimited quantities of iron ore exist on Lake Winnipeg, and in the district between this lake and Hudson Bay; and we have no doubt that in a short time, with proper railroad facilities, this vast district will become the great mineral reservoir, for the whole Dominion of Canada, and probably for the United States."

The Fort William *Echo* gives the following particulars concerning the iron deposit owned by the McKellar Bros. and Graham, Horne & Co., on the Atic Okan river (near the Seine):—

"The rich iron ore occurs in a great lode or belt with one and in places two partings of silicious, chloritic and dioritic schist, 10 to 50 feet in thickness of 100 to 150 feet. The iron lode conforms with the associated strata and dips north at an angle of about 80 degrees to the horizon, and shows the rich body of ore along the strike for a distance of nearly a mile and a

half, the ore holding its full size along the middle position for about half this distance. It forms a mountain range along the whole way, that rises to an elevation of about 100 feet above the level of the surrounding plain for a good portion of the distance; so that it presents excellent facilities for extensive and cheap mining."

The quality of the ore as shown by Professor Chapman, the great authority on iron ores in Canada, is second to none. He states, in the certificate of analysis, "so far as regards composition and physical characters, a better ore could not be obtained." He shows the ore to contain 70.06 per cent. metallic iron, no titanitic acid, and only a very small amount of sulphur, and phosphorus, practically none, the balance being alumina and silica.

LAKE OF THE WOODS DISTRICT.

A sixth interest in the Gold Hill location has been sold for \$500 to Mr. A. Gillis, of Belleville, Ont.

It is rumored that Mr. Dobie has refused \$15,000 for a one-sixth interest in the Pine Portage Mine.

The Gold Mining company have been compelled to stop work on their property near Rat Portage by a Mr. Mather, who claims the mineral under his timber lease.

The miners in the vicinity of Rat Portage have taken steps to petition both the Ontario and the Dominion Governments against the difficulty of securing valid titles to their properties, many of them have been waiting since 1879 for a title to their claims and their patience is becoming exhausted.

Manitoba and N.W.T.

Sir Alexander Galt reports that the coal taken from the mines at Lethbridge improves in quality the further in operations are carried. It is now selling at \$6.50 on the cars, and \$7.25 delivered. He expects that the output for the winter will increase to 400 tons per day.

The first meeting of the Canadian Anthracite Coal Mining Company held at Winnipeg on the 16th November elected the following as directors: McLeod Stewart, Ottawa, Ont., president; Senator Thorp, Eau Claire, Wis.; vice-president; H. Ingram, President of the National Bank, Eau Claire, Wis., treasurer; A. Puge, St. Paul, general-manager. Messrs. Dennis Ryan, John Stewart, W. B. Scarthe, E. A. Bronson and Archibald Stewart are also mentioned as directors of the company. The subscribed capital of the new company is \$500,000.

This company has been formed to develop the deposit of anthracite coal in the vicinity of the Cascade mountain, 75 miles west of Calgary. It owns 1,360 acres of land containing the whole of the available deposit. The seam or vein has been reported by Dr. Geo. M. Dawson, Assistant Director, Geological Survey, and others, as measuring at the further opening four feet and eight inches in thickness, having increased from its outcrop to this width from four feet. It is five feet and two inches in thickness at the Black Diamond or Hughes mine, nearly three miles distant. The stratum may, therefore, be regarded as having an average thickness of 5 feet with but little, if any variation. From a calculation made by Mr. C. D. Wilber, Inspector of mining properties. In Chicago, it is estimated that every three feet of stratum will give 7,392 tons; and 300 feet will give 100 times as much or 739,000 tons. Reasoning on this basis

the company calculate that at a trifle over 400 feet in depth that there are 1,000,000 tons of anthracite coal.

The Manitoba *Free Press* says that with careful management and having the co-operation of the Canadian Pacific Railway, whose desire it is to foster enterprise, which will build up and develop the mineral resources of the far west, the future of this company is of a promising character. The development has been going on for the past month under Pennsylvania management, the promoters being desirous that the best seams be tunnelled and developed, and the coal properly prepared before placing it on the market.

British Columbia.

A one-fourth interest in the old Channel Company in the Granite creek district was recently sold for \$750.

There is a vital necessity for a waggon road from Columbia River to McCulloch Creek in order that supplies and machinery may be brought in.

At the mouth of Cairn's Creek (30 miles from Revelstoke) J. H. Cameron has staked a large claim, and is now on the ground making preparations for work next season.

A prospecting party have discovered gold at a creek about eighty miles from Barkerville. The specimens shown are good and miners will go to the new gold field in spring.

A number of parties are prospecting in the vicinity of Slate creek. From latest reports some excitement exists over the reported find of a \$215 nugget in the neighborhood.

A fine seam of coal $5\frac{1}{2}$ feet thick has been struck by the East Wellington Colliery. It is also reported that the level running down the valley from No. 3 shaft of the Wellington Collieries has also opened up a splendid seam of superior coal.

A large number of quartz claims have been taken up and prospected in the Big Bend district, 70 miles from Revelstoke, on the Columbia River. Sufficient work has not been done on any of them yet to test their richness, but old miners pronounce the indications as very favorable.

In the same district a short distance from the claim of Messrs. George Platt & Co., a farmer from Manitoba is industriously at work fluming a canyon, an undertaking which is pronounced by those who have seen it, to be one of the greatest exhibitions of pluck and perseverance in the history of mining.

At a meeting of the B. C. Mining Company, held at Victoria on Thursday 21st ult., arrangements were made to extensively prospect their property known as the Cariboo location. The present shaft will be straightened and sunk lower, cross-cutting and drifting in the descent. The estimated cost of the work is placed between five and six thousand dollars.

Rumours of a rich find on Vancouver Island are prevalent in Victoria. A *Colonist* representative states that he has been shown a specimen seamed with gold, which contains as much of the precious metal as quartz. It is he says larger

than a man's fist, weighs three pounds four ounces, and is estimated worth over \$80 in gold. Some suspicion exists as to the truth of the story.

Specimens of quartz taken from the ledges known as "Senator Jones" and "Governor Perkins," near Lowhee creek, were recently forwarded to the Government Assay office and have netted from \$55 to \$150 to the ton. The vein is thought to be a continuation of the "Bonanza" ledge owned by the B. C. Mining Company.

As an instance of the recent revival in quartz rock in the vicinity of Richfield, it should be stated that no fewer than 39 registrations of quartz were made during September at the Government office of that place, while applications for mining ground, water privileges, free miner's certificates, new, and renewals, are of daily occurrence.

Recent tests made of the quartz ledge, commonly known as "Perseverance Claim," near Coldstream are thought to be sufficiently good to induce the locators to proceed with the work of prospecting the property. The ledge is one foot thick on the surface, and widens to two feet at a depth of six feet. The locators entertain the belief that it will improve as it is further developed.

Mr. McCullum who has been for the past sixteen months in the mines at the Big Bend district has arrived in Victoria. He reports very favorably of that district. Mr. S. Adler who has arrived in Victoria, Granite Creek, describes it as the worst mining camp he has known since 1850. Those who are remaining are only holding on in the hope of an improvement. If gold is secured in paying quantities it will be found in the hill claims. Some of these latter have paid wages. A house that cost \$600 in labor alone was sold for two glasses of whiskey. Another that cost \$1,500 was sold for \$15 and cut into firewood. Goods are being sacrificed. About forty white men still remain.—*B. C. Colonist*.

A correspondent writing to the *Colonist* regarding the mines at Misquito Creek says that: "The Discovery," last year took out \$10,000; but this year they had just struck good pay when the water gave out. They are now bringing in a ditch five miles, and when this is ready it is expected that a continual head of 200 inches will be had. Above this claim is that worked by Plyn Bros., which also suffers from a lack of water, though last year it paid well. They were engaged in cleaning up at the time of our visit and we saw a couple of pans of dirt worked. A couple of shovels of a mixture of mud and gravel were placed in the pan and then worked with water until nothing was left but the gold. It had almost all been washed away and we thought there was not a color, but a minute more disclosed several nuggets which weighed \$6 in all. The second pan furnished \$3. No wonder there is a resistless charm about the rough labor when from the earth a miner can wash the glittering yellow gold. The gold of Mosquito creek is of the finest character found in Cariboo, weighing \$19 to the ounce.

Recent events, writes an English financial paper, have made it so thoroughly manifest that the British investor has a liking for gold mines that it is much to be regretted that energy is lacking in the development of the gold-bearing districts of British Columbia. Here is a vast

and sparsely populated region, rich in mineral resources: who will take it in hand? Mr. Koch, from whose report to the gold commissioner of the Cariboo district we recently quoted, points out that as yet there has been nothing like an adequate examination of the gold quartz deposits in that part of Her Majesty's dominions. He makes special reference to Hixon creek, where he superintended operations in the hope of finding a paychute of quartz. "A shaft was sunk, and at a depth of 60 feet a drift was started, and the vein was found at the exact point where it was estimated to be, and no vein in California has truer or better defined walls." Mr. Koch proceeds to admit that it is quite possible a greater depth must be reached before paying quartz in large quantities will be obtained, but he expresses himself satisfied with the results of recent prospecting, and declares his opinion that the gold quartz deposits of the district are not merely local, but that a regular and unbroken formation exists; that this continues for many miles, and that true fissure, and even contact, veins of gold and silver can be found by intelligent prospectors. If this belief be well founded most people will be of opinion that intelligent prospectors had better set to work at once—unless, indeed, they are afraid that the authorities of British Columbia, following the example of the Dogberries of Queensland, are only waiting until English capital has been invested in their mines to give the whole business a gratuitous but official black eye.

Mr. Ames Bowman, M.E., of the Provincial Government geological staff, has expressed a most favorable opinion of the mineral resources of the Cariboo district. He has just returned from the work of occupying a large number of additional triangulation stations for geography, and has been following the formations, and placer mines, and quartz ledges in detail. The principal quartz ledges in the old placer district were visited, to trace, as far as possible, the connection between the ledges and the placers, and particular attention was given to the strike of the rocks containing the auriferous deposits. In this way the gold belt has been traced and segregated from one end of the country to the other. Mr. Bowman states that to the north-eastward there is a newer formation, differing entirely from the slate country of Cariboo, in which mining has been profitably carried on. In this fossils have been found, showing it to be newer than Cariboo, but older than any of the gold-bearing country in California. In the southeastern corner of the field work is a formation newer than the gold-bearing country of California. He advocates the adoption of central chlorination works or leading establishment which would form a market for the products of the mills and to show the necessity for this describes the process as follows: "There are three different kinds of roasting furnaces in general use; first, the reverberatory in which the ore is shovelled from one end to the other as in a bake oven; the cylinder, where the same thing is done mechanically; the Stetefeldt furnace in which it is dropped down a shaft, falling from one shelf to another until the sulphur is burned out. The roasted ore, which is now a fine dust, is placed in a tank or tub, saturated with chlorine gas and leached out with water; it now being in the form of a red mud is placed in crucibles and converted into bullion. Thus, if the roasting is not done just right, much gold is lost. It is evident these are all expensive appliances and require skill. An immense quantity of ores requiring that treatment are in the Cariboo district and properly managed chlorination works would prove a profitable in-

vestment to all concerned. In case silver occurs with gold a different process of leaching is required, but the method does not vary materially. In the event of chlorination or leaching works being available, people having ledges would merely dress their ores in a form which would bear transportation to a considerable distance, occasionally on horseback with profitable return. Such a custom works would thus allow men of small capital to successfully work ledges, as they would be in a similar position to the farmer who brought his wheat to a grist mill to be ground into flour.

Vertical shafts are preferable to inclined shafts when heavy pumping machinery has to be put up, for pumps and rods are more easily fixed and require fewer repairs when they are arranged vertically. However, many metallic mines may be quoted, especially in England, where large engines, work pumps in inclined shafts or in shafts which have been sunk vertically, when they intersected the deposit and have then been carried on along its dip. This arrangement of inclined shafts is justifiable in working alone when the enclosing rocks are very hard. In this case in fact, an inclined shaft allows the lode to be studied in detail during the sinking itself. If, however, a large output is required the preference should certainly be given to vertical shafts, for, in order to obtain such a result, great loads must be raised, at velocities which are only admissible in vertical shafts, furnished with the best system of quives.

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MINING REGULATIONS

To Govern the Disposal of Mineral Lands other than Coal Lands, 1886.

THESE REGULATIONS shall be applicable to all Dominion Lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, iron, or other mineral deposits of economic value, with the exception of coal.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein, either by surface or subterranean prospecting, for mineral deposits, with a view to obtaining under the Regulations a mining location for the same, but no mining location or mining claim shall be granted until the discovery of the vein, lode, or deposit of mineral or metal within the limits of the location or claim.

QUARTZ MINING.

A location for mining, except for iron, on veins, lodes, or ledges of quartz or other rock in place, shall not exceed forty acres in area. Its length shall not be more than three times its breadth, and its surface boundary shall be four straight lines, the opposite sides of which shall be parallel, except where prior locations would prevent, in which case it may be of such a shape as may be approved of by the Superintendent of Mines.

Any person having discovered a mineral deposit may obtain a mining location therefor, in the manner set forth in the Regulations which provide for the character of the survey and the marks necessary to designate the location on the ground.

When the location has been marked conformably to the requirements of the Regulations, the claimant shall, within sixty days thereafter, file with the local agent in the Dominion Lands Office for the district in which the location is situated, a declaration or oath setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as aforesaid; and shall, along with such declaration, pay to the said agent an entry fee of FIVE DOLLARS. The agent's receipt for such fee will be the claimant's authority to enter into possession of the location applied for.

At any time before the expiration of FIVE years from the date of his obtaining the agent's receipt, it shall be open to the claimant to purchase the location on filing with the local agent proof that he has expended not less than FIVE HUNDRED DOLLARS in actual mining operation on the same; but the claimant is required before the expiration of each of the five years, to prove that he has performed not less than ONE HUNDRED DOLLARS' worth of labor during the year in the actual development of his claim, and at the same time obtain a renewal of his location receipt, for which he is required to pay a fee of FIVE DOLLARS.

The price to be paid for a mining location shall be at the rate of FIVE DOLLARS PER ACRE, cash, and the sum of FIFTY DOLLARS extra for the survey of same.

Not more than one mining location shall be granted to any individual claimant upon the same lode or vein.

IRON.—The Minister of the Interior may grant a location for the mining of iron, not exceeding 160 acres in area, which shall be bounded by north and south and east and west lines astronomically, and its breadth shall equal its length. Provided, that should any person making an application purporting to be for the purpose of mining iron thus obtain, whether in good faith or fraudulently, possession of a valuable mineral deposit other than iron, his right in such deposit shall be restricted to the area prescribed by the Regulations for other minerals, and the rest of the location shall revert to the Crown for such disposition as the Minister may direct.

The Regulations also provide for the manner in which land may be acquired for milling purposes, reduction works, or other works incidental to mining operations.

Locations taken up prior to this date may, until the 1st of August, 1886, be re-marked and re-entered in conformity with the Regulations without payment of new fees, in cases where no existing interests would thereby be prejudicially affected.

PLACER MINING.

The Regulations laid down in respect of quartz mining shall be applicable to placer mining as far as they relate to entries, entry fees, assignments, marking of localities, agents' receipts, and generally where they can be applied.

The nature and size of placer mining claims are provided for in the Regulations, including bar, dry, bench, creek or hill diggings, and the RIGHTS AND DUTIES OF MINERS are fully set forth.

The Regulations apply also to

RED-ROCK FLUMES, DRAINAGE OF MINES AND DITCHES.

The GENERAL PROVISIONS of the Regulations include the interpretation of expressions used therein; how disputes shall be heard and adjudicated upon; under what circumstances miners shall be entitled to absent themselves from their locations or diggings, etc., etc.

THE SCHEDULE OF MINING REGULATIONS

Contain the forms to be observed in the drawing up of all documents, such as:—"Application and affidavit of discoverer of quartz mine." "Receipt for fee paid by applicant for mining location." "Receipt for fee on extension of time for purchase of a mining location." "Patent of a mining location." "Certificate of the assignment of a mining location." "Application for grant for placer mining and affidavit of applicant." "Grant for placer mining." "Certificate of the assignment of a placer mining claim." "Grant to a bed-rock flume Company." "Grant for drainage." "Grant of right to divert water and construct ditches."

Since the publication, in 1884, of the Mining Regulation to govern the disposal of Dominion Mineral Lands, the same have been carefully and thoroughly revised with a view to ensure ample protection to the public interests and at the same time to encourage the prospector and miner in order that the mineral resources may be made valuable by development.

COPIES OF THE REGULATIONS MAY BE OBTAINED UPON APPLICATION TO THE DEPARTMENT OF THE INTERIOR.

A. M. BURGESS,

Deputy Minister of the Interior.



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D. POTTINGER,

Chief Superintendent.
Railway Office, Moncton, N.B.,
Nov. 13th, 1935.

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White Marble Quarry on Calumet Island.

At this quarry there is an inexhaustible supply of most beautiful White Marble. Samples to be seen and information obtained at the office of the MINING REVIEW.



DEPARTMENT OF INLAND REVENUE.

An Act respecting Agricultural Fertilizers.

THE public is hereby notified that the provisions of the Act respecting AGRICULTURAL FERTILIZERS came into force on the 1st of January, 1886, and that all Fertilizers sold thereafter require to be sold subject to the conditions and restrictions therein contained—the main features of which are as follows:—

The expression "fertilizer" means and includes all fertilizers which are sold at more than TEN DOLLARS per ton, and which contains ammonia or its equivalent of nitrogen, or phosphoric acid.

Every manufacturer or importer of fertilizers for sale, shall, in the course of the month of January in each year, and before offering the said fertilizer for sale, transmit to the Minister of Inland Revenue, carriage paid, a sealed glass jar, containing at least two pounds of the fertilizer manufactured or imported by him, with the certificate of analysis of the same, together with an affidavit setting forth that such jar contains a fair average sample of the fertilizer manufactured or imported by him; and such sample shall be preserved by the Minister of Inland Revenue for the purpose of comparison with any sample of fertilizer which is obtained in the course of the twelve months then next ensuing from such manufacturer or importer, and which is transmitted to the chief analyst for analysis.

If the fertilizer is put up in packages, every such package intended for sale or distribution within Canada shall have the manufacturer's certificate of analysis placed upon or securely attached to each package by the manufacturer; if the fertilizer is in bags, it shall be distinctly stamped or printed upon each bag; if it is in barrels, it shall be either branded, stamped or printed upon the head of each barrel, or distinctly printed upon good paper and securely pasted upon the head of each barrel, or upon a tag securely attached to the head of each barrel; if it is in bulk, the manufacturer's certificate shall be produced and a copy given to each purchaser.

No fertilizer shall be sold or offered or exposed for sale unless a certificate of analysis and sample of the same shall have been transmitted to the Minister of Inland Revenue, and the provisions of the foregoing sub-section have been complied with.

Every person who sells, or offers or exposes for sale, any fertilizer, in respect of which the provisions of this Act have not been complied with—or who permits a certificate of analysis to be attached to any package, bag or barrel of such fertilizer, or to be produced to the inspector, to accompany the bill of inspection of such inspector, stating that the fertilizer contains a larger percentage of the constituents mentioned in sub-section No. 11 of the Act than is contained therein—or who sells, or offers or exposes for sale, any fertilizer purporting to have been inspected, and which does not contain the percentage of constituents mentioned in the next preceding section—or who sells, or offers or exposes for sale, any fertilizer which does not contain the percentage of constituents mentioned in the manufacturers' certificate accompanying the same, shall be liable in each case to a penalty not exceeding fifty dollars for the first offence, and for each subsequent offence to a penalty not exceeding one hundred dollars; Provided always, that deficiency of one per centum of the ammonia or its equivalent of nitrogen, or of the phosphoric acid, claimed to be contained, shall not be considered as evidence of fraudulent intent.

The Act passed in the forty-seventh year of Her Majesty's reign, chaptered thirty-seven and intitled "An Act to prevent fraud in the manufacture and sale of agricultural fertilizers," is by this Act repealed, except in regard to any offence committed against it or any prosecution or other act commenced and not concluded or completed, and any payment of money due in respect of any provision thereof.

A copy of the Act may be obtained upon application to the Department of Inland Revenue.

E. MIALI,

Commissioner.



Tenders for a License to Cut Timber on Dominion Lands in the Province of British Columbia.

SEALED TENDERS addressed to the undersigned and marked "Tender for a Timber Berth," will be received at this Office until noon on Monday, the 1st day of November next, for four timber berths of ten square miles each, more or less, numbered respectively 4, 5, 8 and 9, situated on Kicking Horse River and Ottentail Creek, a tributary of the Kicking Horse River, near Field and Ottentail Stations, on the line of the Canadian Pacific Railway, in the Province of British Columbia.

Sketches showing the position approximately of these berths, together with the conditions on which they will be licensed, may be obtained at this Department or at the Crown Timber Offices, Winnipeg, Calgary, N. W. T., and New Westminster, British Columbia.

A. M. BURGESS,

Deputy of the
Minister of the Interior.

Department of the Interior,
Ottawa, 14th August, 1886.



Tenders for a License to Cut Timber on Dominion Lands in the Province of British Columbia.

SEALED TENDERS addressed to the undersigned and marked "Tender for a Timber Berth," will be received at this Office up to noon on Wednesday, the 1st day of December next for three timber berths of fifty square miles each, more or less, numbered respectively 16, 17 and 18, situate on the west side of the Columbia River, near Golden City Station, on the line of the Canadian Pacific Railway, in the Province of British Columbia.

Sketches showing the position approximately, of these berths, together with the conditions upon which they will be licensed, and the forms of tender therefor, may be obtained at this Department or at the Crown Timber Offices at Winnipeg, Calgary, N. W. T., and New Westminster, British Columbia.

A. M. BURGESS,

Deputy of the
Minister of the Interior.

Department of the Interior,
Ottawa, 9th September, 1886.

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Correspondence with Owners of Mines and Capitalists desirous of investing is most respectfully solicited.

Address all Communications to

E. G. POWELL,

14 Metcalfe Street, Union Chambers, Ottawa, Canada.

CANADIAN MINING REVIEW

Vol. 4.—No. 9.

1886—OTTAWA, DECEMBER—1886.

Vol. 4.—No. 9.

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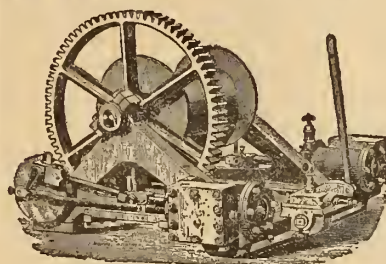
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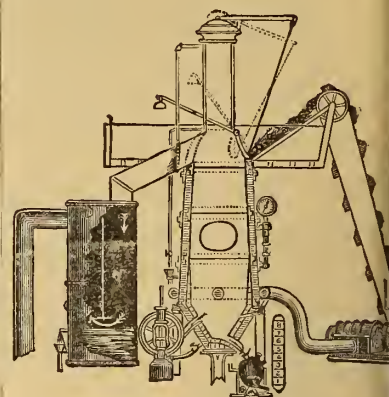
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**MAIL CONTRACT**

SEALED TENDERS, addressed to the Postmaster General will be received at Ottawa until noon on FRIDAY, 17th December, 1886, for the conveyance of Her Majesty's Mails, on a proposed Contract for four years, three times per week, between ASHTON and PROSPECT, from the 1st January next.

Printed notices containing further information to conditions of proposed Contract may be seen at blank forms of Tender may be obtained at the Post Office of Ashton, Munster, Dwyer Hill and Prospect, and at this office.

T. P. FRENCH,
Post Office Inspector,
Post Office Inspector's Office,
Ottawa, 23rd Oct., 1886.

Notice to Contractors.

SEALED TENDERS addressed to the undersigned will be received at this Office on FRIDAY, the 19th instant, for the Clearing and Removal of Snow, etc., from the Public building Ottawa; and also for the Removal of Snow, etc., from the roofs of buildings, out-buildings, walk-avenues or roads, etc., at Rideau Hall.

Forms of Tender and Specifications can be had at this office, where all necessary information can be obtained.

Separate Tenders will be required for each work and must be endorsed "Tender for Removal of Snow, Public Buildings," and "Removal of Snow Rideau Hall."

Each tender must be accompanied by an accepted cheque made payable to the order of the Honorable the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party decline to enter into contract when called upon to do so, or if he fail to complete the work contracted for. If the tender not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

By order,
A. GOBEL,
Secretary,
Department of Public Works,
Ottawa, 12th Nov., 1886.

ROCK AND ORE BREAKERS OR CRUSHERS.**"THE BLAKE STYLE."**

This style of Rock Breaker after 15 years practical test at HOME and ABROAD has proved to be the BEST ever designed for the purpose of breaking all kinds of hard and brittle substances, such as QUARTZ, EMERY, CORRUNDUM,

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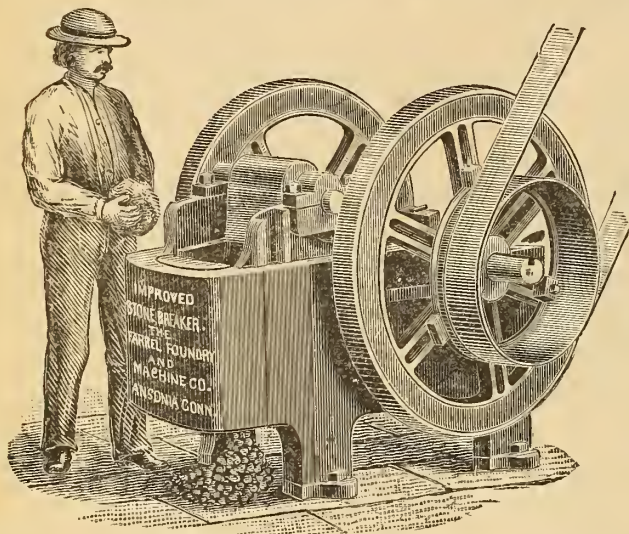
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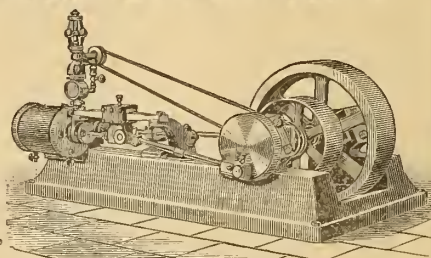
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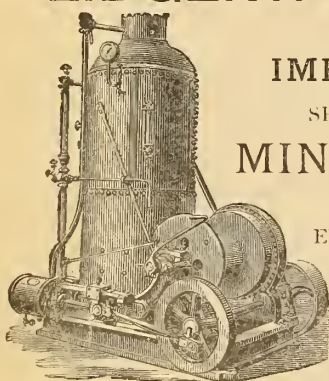
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**Notice to Contractors.**

SEALED TENDERS addressed to the undersigned, and endorsed "Tender for Du Lievre Works," will be received until FRIDAY, the 26th day of NOVEMBER, next, inclusively, for the construction of a Lock and Dam and works in connection therewith, on the River Du Lievre at Little Rapids, Ottawa County, Quebec, in accordance with a plan and specification to be seen at the Department of Public Works, Ottawa, on and after Friday, the 5th of November next, where printed forms of tender can be obtained.

Persons desirous of tendering are requested to make personal enquiry relative to the work to be done, and to examine the locality themselves, and are notified that tenders will not be considered unless made on the printed forms supplied, the blanks properly filled in, and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque made payable to the order of the Honorable the Minister of Public Works, for the sum of two thousand five hundred dollars (\$2,500) which will be forfeited if the party decline to enter into a contract when called upon to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,

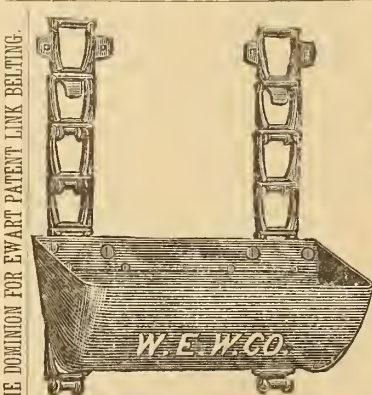
A. GOBEL,

Secretary.

Department of Public Works,
Ottawa, 30th October, 1886.

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ORE, EARTH, GROUND PHOSPHATE.

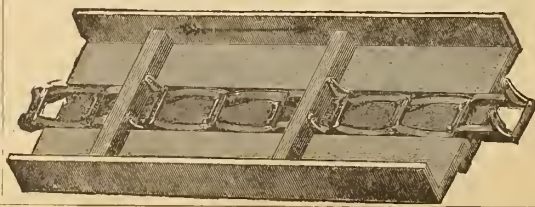


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The CANADIAN MINING REVIEW is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts as well as others interested in Canadian Mineral Lands are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 10th of the month.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

Mr. W. A. Allan, of this city, has shown us some very fine blocks of white marble which he has just received from his property in the Upper Ottawa district. The specimens are of a very superior quality, fully equal to the best Italian grey marble. The blocks are to be sawn and placed on exhibition at an early date.

In our last issue attention was drawn to the specimens of chromic iron recently exhibited at the Colonial and Indian Exhibition and to the deposits of this ore to be found within the Province of Quebec. We have since received a communication from an authority in that province who states that last winter the Hon. L. G. Ross and Dr. James Reed, Reedsdale, shipped several tons of the ore, averaging 50 per cent. of chromic oxide, to Philadelphia, at \$18 per ton of 1240 lbs. The ore was placed on the cars at this price at Robertson station, Quebec Central Railway (near the Thitford Asbestos Mines). Samples from the deposit assayed by Professor Ditmar, Anderson's College, Glasgow, average 52.48 chromic oxide. The ore is found in large quantities in lot 7, range 10, at Leeds, Megantic county, while another deposit exists on lot 5, in the 4th range, Thitford. The writer adds "that among other purposes it is used for rapid tannery, and that there is no difficulty in getting large quantities of the ore, provided remunerative prices could be obtained for it."

If testimony was required to demonstrate the great and valuable work that is being accomplished from year to year by our Geological Survey it is undoubtedly evi-

denced in the voluminous reports of its doings periodically issued by its eminent director, Dr. Selwyn. That for 1885 is before us, and like its predecessors it is, from beginning to end, replete with much valuable information regarding the topography, the geological structure, and the mineral wealth of our Dominion. As in former years the work of exploration and survey has been vigorously pursued over a vast area, portions of every province and territory from Nova Scotia to the Pacific coast, have been visited and investigated and a flood of new light has been thrown upon districts hitherto unknown or but imperfectly understood. To the public at large the report will prove of inestimable value while the student of our geology and particularly of our mineralogy will find within its necessarily condensed but very able summary, much useful matter of great variety and varied interest. The notes and statistics bearing upon our mineral resources are particularly worthy of attention.

Referring to the establishment of a mining and mineralogical department and the collection and publication by the Survey of statistics of mines and mineral product, a question which of late has been the subject of much wholesome discussion. Dr. Selwyn writes:—"I may say that after carefully considering the matter in all its aspects, I am led to the belief that the system I originally adopted, namely, that of issuing a circular with questions to be answered on a form printed for this purpose, and when convenient or considered necessary, to be accompanied by personal application on the ground, is that which is most likely to afford the desired result. There are two gentlemen, trained mining engineers, now employed on the survey, to whom the work of issuing, collecting and compiling the returns might be entrusted, and, and who might also each year visit and critically examine and report on one or two mining districts. In this way, every mining district in the country would be visited at intervals of one or two years, unless some special development called for more frequent examination. At present the chief mining developments are in the provinces of Nova Scotia, Quebec and British Columbia, and in each of these provinces the local government employs a mining inspector or engineer, who collects statistics and reports on the mines of the province.

"It would not, therefore, seem desirable or necessary that the work should also be done in these provinces by the Geological Survey, but with the co-operation and consent of the provincial authorities, the results obtained by their officers might be incorporated in the general statement issued annually by the Geological Survey, and thus gain wider publicity.

"So far as the special examination of mining districts is concerned, a commencement was already made in 1883 and continued in 1884, the districts examined being: In 1883, the Lake of the Woods gold region, and the phosphate region in the townships of Wakefield and Templeton; and in 1884 the Marmora gold and iron bearing region

around the north shore of Lake Superior; also some of the mines in the province of Quebec. If the scheme now proposed is carried out, no further assistance would be required, but the two gentlemen named, Messrs. E. Coste and E. D. Ingall, should be appointed on the permanent staff with the title of 'Mining Geologists.'"

Again we have to add that the establishment of a thoroughly organized and equipped Bureau of Mines and Statistics is of vital importance to the country at large, and that if there is to be such an establishment it must be founded on a permanent basis with an adequate and efficient staff. The work of collecting and compiling information and statistics in connection with Canadian mines and minerals is too important to be left to the tender mercy of any half-hearted organization, and it can never be done in a manner that will be acceptable to the mining public until such time as a distinct and separate department, thoroughly and efficiently equipped has been added to the Survey.

In another column our readers will find a reprint of Mr. Eugène Coste's valuable pamphlet, "Observations on Mining Laws and Mining in Canada," which is presented as Part K of the Annual Report, 1885, just published by the Geological and Natural History Survey of Canada. Mr. Coste, who, by-the-way, is a graduate of the School of Mines, Paris, and a mining engineer of marked ability, has had an extensive and varied experience of the mining districts of England and Europe, and his remarks on the state of the mining industry of our Dominion, and particularly to those districts lying within the Provinces of Ontario and Quebec, will be read with much interest. His suggestions for the better development of the mineral resources of the country are particularly well timed and worthy of the best attention.

Among other papers read before a recent meeting of the Mining Institute of Scotland, was one by Mr. David Reid, Glasgow, on "Pitkins Electric Safety Lamp." Examples of the lamp were exhibited and explained from which it was shown that it consists of a small storage battery encased in a light box with lamp attached capable of being carried by the miner into his working place. The lecturer stated that it gave a splendid light underground and that when perfected it would become the lamp of the future.

An effort is being made by several leading newspapers to impress upon the Dominion Government the necessity of giving adequate protection to our iron industry. The Montreal Star, handling the question editorially, says: "If it is not considered advisable at present to increase the custom duties on iron and steel there can be no general objection to the passage of an act obliging all railways receiving public assistance to use rails and rolling stock of Canadian manufacture. If such a law was passed and pamphlets descriptive of the

iron and coal deposits of the Dominion sent to the leading iron men of Great Britain and the United States there can be no doubt that capital would be brought into the country to develop our iron resources, and a great industry would be established on a paying basis. The first step should be to advertise for tenders for Canadian made rails for the extension of the Intercolonial railway through Cape Breton. If it were understood that, in future, not only Government railways, but all railways receiving public aid, would be obliged to secure their construction materials in Canada, there would be no difficulty in securing tenders. The construction of the railway through Cape Breton would perhaps be delayed for a short time by such an arrangement, but no part of the Dominion has more to gain from the adoption of such a policy than the island of Cape Breton. The *Island Reporter* recently claimed that the minerals of Cape Breton Island were worth more to the Dominion than all the farming lands of the great North-West, and certain it is that noted geologists have said that there is more coal and iron to the square inch in that end of Nova Scotia than in any other known quarter of the world. The island would certainly be benefited by the encouragement of the iron industry. By the immediate adoption of such a policy, the Government could prepare the way for a revision of the tariff, giving adequate protection to every branch of the iron and steel industry."

A statement which evidently emanated from the associated press agent at New Glasgow, Nova Scotia, recently gained currency to the effect that a very bitter feeling had been created by the action of the Manager of the Dominion Coal Mines at Westville in refusing to permit the men presently working on full time there to share their work with those of their fellows who had been thrown out of employment at the close of the shipping season. On enquiry it appears that the company made every effort to retain as many of their hands as possible and that at present there are more employees than their limited winter operations demand. This will be the better understood when it is learnt that the decrease of men is only 35 per cent., while the actual work done shows a falling off of 60 per cent. The criticisms which the action of the manager has involved seem to be uncalled for.

Mineral Deposits.

BETWEEN THE GREAT LAKES AND THE HUDSON BAY.

In an article to an esteemed contemporary on the metallic ores to be found between the great lakes and the Hudson Bay, Dr. Robert Bell of our Geological Survey writes: "Iron has been found in several places not far from Algoma Mills, and again at Desert Lake, north of the Bruce mines. A deposit of iron was reported on an island in Lake Nipissing by Mr. Murray, of the Geological Survey, nearly thirty years ago. Still farther north, toward James's Bay, is the largest iron deposit yet known in that whole country, and situated at the foot of the Grand

Rapid of the Mattagami River. It was first pointed out by me in 1875. Proceeding toward Lake Superior, very large quantities of iron ore are found, not far north of Batchawana Bay. I also found indications of large deposits of iron near the Montreal and Perch rivers. A deposit of hematite was discovered by one of my assistants on the Slate islands, in 1870, and some low-grade magnetite has long been known to occur at the mouth of the Little Pic River. To the north of this region, a perfect mountain of iron has been discovered by that fortunate prospector, Mr. Peter McKeller, of Fort William. It is back in the woods, in the unsurveyed region, about 200 miles northeast of Port Arthur. In my reports of 1869 and 1870, I mentioned certain discoveries of iron near Long Lake, on the south side of Lake Nipigon, on the Sturgeon River, some of which have since been found to be important. A comparatively valuable deposit of magnetite, in workable quantities, occurs near Silver Lake, not far from the head of Thunder Bay. Quite lately, a rich deposit of magnetite has been found on the celebrated 3 A silver location, Thunder Bay. Still farther west, during the past summer, two important discoveries have been made, one of them on the Atik-Okan (Reindeer Antler), just north of the south bend of the Seine River, about 100 miles northwest of Thunder Bay, and thirty miles south of the Canadian Pacific Railroad track. The ore is of first-rate quality, and described as occurring in immense quantities, and it is probable that it will be extensively worked before long.

The other large deposit occurs about 100 miles farther west, and is also south of the Canadian Pacific Railroad, at a considerable distance to the eastward of the Lake of the Woods. There is a rich deposit of hematite on Big Island in Lake Winnipeg. Between Lake Winnipeg and York Factory, on Hudson's Bay, at the narrows of Knee Lake, there is a large quantity of magnetite. I discovered one deposit of rich magnetite, in the region I was exploring this summer, but am unable to give particulars until I have made my official report.

Copper is known to exist in more or less promising quantities at numerous places on the north shore of Lake Huron. One of these is the Wallace mine, near Killarney, which was worked at one time for both copper and nickel. Then passing westward, the celebrated Bruce mines are situated about 40 miles east Sault Ste. Marie. Work was begun here in 1846 and continued until 1876. In the palmiest days of its enterprise, large numbers of Cornish miners were employed, and quite a town was built. In 1876, the mines closed, and it being the year of the Philadelphia exhibition, I collected statistics that showed the output during the thirty years to have amounted to \$3,300,000. Copper ore has been found in notable quantities at several points inland from the Bruce mines and around Echo Lake.

I have not yet examined the Sudbury mines personally, but at the time ore was discovered there, some three or four years ago, I had samples of all the different kinds sent to me. The first ore prepared for market amounted to about 3,000 tons, which, however, was of a lower grade than the producers supposed, and I was informed that, on the advice of one of their New York correspondents, they cobbled it over and reduced the 3,000 tons to 1,000, which was found to contain about 7 per cent. of metal. In my explorations in the extensive region between Lake Huron and Hudson's Bay, I have found many indications of copper, which have been reported from time to time. Among the earliest copper mining enterprises in Canada, were those of the

Quebec and British American mining companies. The works of the former were carried on at Namanise (Little Sturgeon), in the Lake Superior region. In later years the Lake Superior Native Copper Company carried on operations in the same neighborhood. Recently, this company has been reorganized as the Lake Superior Copper Company, but little is done at present. On Michipicoten Island, in the northeast angle of Lake Superior, a company, called the Michipicoten Native Copper Company, was organized a few years ago. After working a short time, this company was also reorganized, and last winter had a small force of men at work. At both the above localities, copper occurs in the native state. About forty years ago, numerous locations were taken up, principally in the names of gentlemen residing in Montreal, but which were held by the Montreal Mining Company. These were afterward sold to what was called the Silver Islet Mining Company, but more correctly the Ontario Mineral Lands Company. One of the locations thus taken up was the celebrated Wood's location, in which Silver Islet is situated. Some locations were worked near Nipigon Bay and southwest of Thunder Bay. I have found indications of copper in many places northwest of Lake Superior.

The principal deposits of lead in the district under consideration are at the Victoria mine, near Garden River, a short distance east of Sault Ste. Marie. This mine was principally owned in Quebec City. A short distance to the north of that, another lead mine, the Cascade, has also been worked to some extent. On the northwest side of Black Bay, Lake Superior, a rich vein of lead was worked by the Enterprise Mining Company. Other large deposits of this ore are known to exist in the same neighborhood, but, owing to the very low price of lead at the present time, there is not much inducement to open them. Around Thunder Bay also, a number of lead-bearing veins have been discovered. Lead occurs in several localities on the Lake of the Woods.

Silver is also well represented. It was first found many years ago on Lake Superior, notably on Michipicoten Island, and Prince's Location, not far from Port Arthur. But the first discovery of silver to attract public attention in late years was that afterwards known as the Thunder Bay mine, situated about three miles northeast of Port Arthur. Here, native silver was found in large quantities, in quartz at the outcrop of the vein. The mine promised to be so rich that immediate steps were taken to prevent its being plundered, owing to the silver being so easily obtainable on the surface. Attempts were made to open the mine, but from various causes, prominent among which was bad management, it never made a success, and has been closed for some years. A short distance southwest of Thunder Bay, another mine was discovered and worked under the name of the Shuniah mine, afterward changed to the Duncan mine. The celebrated Silver Islet mine was discovered in 1868, while Wood's Location was being surveyed by Mr. Thomas Macfarlane, now chief analyst in the Inland Revenue Department here. One of the first blasts at the surface of the vein threw out silver ore to the amount of \$1,500. The mine was worked to the depth of 1,200 feet, and \$2,500,000 worth of silver is said to have been produced. The silver mines at present attracting attention are situated inland or in two groups at twenty-five and thirty-five miles southwest of Port Arthur, in the White Fish River region. The mines in which most work has been done are the Rabbit Mountain, Beaver, Porcupine, and East and West End Silver

Mountain. The three first mentioned are actively worked, and quite lately, the East End Silver Mountain was sold to a joint-stock company in Liverpool for \$150,000 cash, and the company has undertaken to spend a still larger sum on the property.

Traces of gold have been found in various places north of Lake Huron. On Lake Superior a vein containing visible nuggets occurs in Jackfish Bay. On Partridge Lake, nearly one hundred miles to the northwest of Port Arthur, small nuggets are disseminated through a large mass of quartz, and some distance west of this locality another rich gold-bearing vein has been discovered. The Huronian mine, owned by an Ottawa company, is situated near the height of land about one hundred miles west of Port Arthur. Here, a well-marked vein has been worked to some extent. A crushing-mill has been erected, but the principal impediment in the way of the working of this mine is the want of transportation facilities. A good road to the mine has become absolutely necessary. Coal has also been discovered in numerous localities on the Lake of the Woods, but at present little or nothing is done.

Personal.

Our readers will be glad to learn of the return from Britain of Dr. A. R. Selwyn, director of our Geological Survey. Dr. Selwyn held the position of Canadian Commissioner to the late Colonial and Indian Exhibition, and was created a C. M. G. by Her Majesty the Queen.

Phosphate Mining.

THE HIGH ROCK MINE, BUCKINGHAM.

The reports received from this mine are very satisfactory, and indicate that during the past year, operations have been actively pursued and that many important improvements have been made.

Five pits are now working, and at the deepest of these, that known as No. 8, where some 180 feet has been sunk, the miners are at present drifting in the bottom on a paying vein of phosphate about three feet wide. At No. 5 pit, the well-known "Bonanza," they are also drifting at a depth of 160 feet on a vein ranging from 1 to 4 feet in width, which is also paying well. No. 11 pit, 75 feet deep, is reported to be the best, and there, running under the hill on a 500 feet level, the management have discovered a vein of the purest ore 30 feet wide by 15 feet high. Mr. Pickford, the manager, says that "it is the finest show which has ever been seen on the hill, it having yielded last month 296 tons with an average of ten men."

The output for November, 704 tons, is the best on record at the mine, while that for December would probably have exceeded this but for the holidays. As it is, the output will be considerably over 600 tons. So satisfactory are the present state of affairs that the company contemplate increasing the staff to 250 men next summer, and working them in night and day shifts. At present about 120 men are employed.

During the past summer a tramroad extending from the mines to the river landing, two miles in length, has been constructed and some 6,000 tons of ore have been transported over this. It should be mentioned that the total shipment for this season was 6,349 tons, and that this is the largest quantity ever shipped from this property in any one year.

Under the management of Mr. W. W. Pickford, who has so ably conducted the mine since 1884, tramroads have been constructed, new machinery erected, and many other valuable improvements made. Not a little credit is due to this gentleman for the very satisfactory condition of things at this property.

Graphite.

Although Graphite has been known from time immemorial, and its name at once indicates the antiquity of its principal use, its geological origin is still a matter of doubt, and its properties not yet half understood. It belongs to no particular geological horizon, but occurs in rocks of all ages, in beds; imbedded masses, laminae, or scales, more commonly in granite, gneiss, mica, slate, crystalline limestone, and occasionally with deposits of coal. The famous Borrowdale variety is found in nests, in trap, in clay slate. Nearly every locality presents it in some new association, so that it is scarcely to be wondered at that geologists have been puzzled to account for the origin of a mineral that makes its appearance in utter disregard of the laws of deposition, stratification, injection or age. The recent progress of chemistry has thrown some light on this subject, and new theories have been advanced, tending to dispute the vegetable origin of graphite, and to explain its presence on the principle of the decomposition of cyanogen or of other intro-carbon compounds. In the preparation of caustic soda, cyanide of sodium is produced, and when, in the course of the operation, Chili saltpetre is added, to oxidise the sulphides of iron and sodium, and the mass is in a state of fusion, graphite arising from the decomposition of the cyanide rises to the top, where it swims and can be skimmed off, washed and dried, when it presents the appearance of brilliant, light power, perfectly pure and admirably adapted to the manufacture of pencils, and many other purposes. The brilliant, red crystals which form in blast furnaces and now and then give rise to what is called "salamander," were formerly supposed to be pure titanium. Wohler afterwards shewed that they contained cyanogen, and this discovery, together with the appearance of cyanogen in the soda ash manufacture, has led chemists to suspect that the formation of artificial graphite in iron furnaces is not always one to the solution of an excess of carbon in the molten iron, but may be referred back to a compound of nitrogen with carbon, in other words, to the decomposition of cyanogen. Applying these observations to geological phenomena, some authors seek to account for the formation of graphite in nature, on the principle of the chemical decomposition of the cyanides. It is certainly a very ingenuous theory, and has many strong points to sustain it, and as it may finally conduct us to an artificial method for the production of graphite, in any quantity and at reasonable rates run it deserves the careful study and experimental research of all parties interested in the development of this branch of industry.

The *Times* announces that a second assay of rock from the Cowichan ledge, B.C. discovered and located by Mr. Hugh Bell, of Somenos, went \$18 of gold to the ton, and a little silver. Both of the samples referred to and a former sample assayed a week previous, went \$20 in gold, and were from surface rock. It is thought likely that when the lode, which is an extensive one, shall have been sunk upon still better results will be developed.

British Columbia Milling and Mining Company.

Report of Mr. E. A. Koch to Joseph Heywood President of the Company:—

SIR.—At the request of Mr. Joseph Mason by telegraph, dated the 4th inst., I have carefully examined your property, consisting of the American, Cariboo, St. Laurent, and Wilkinson claims, together with the machinery stored in the two buildings. The most prominent surface indications of the existence of mineral-bearing veins I find in this district is the extremely large chimney or blow-out, of quartz, which comes to the surface near the line dividing the St. Laurent, and Cariboo claims. It is a very prominent feature and of itself speaks well for the vein, as samples taken from it for a distance of 750 feet, or up to the centre of the Cariboo claim, immediately over the deep shaft, showed gold in four separate assays ranging from traces of gold up to \$7.30 per ton of 2000 pounds: While its prominence and showing of gold would have been encouraging, that of itself would not by any means have been sufficient to justify any extraordinary expense except by way of prospecting in sinking, say one hundred feet on or near it, and then cross-cutting the vein and drifting some distance on it.

But the 50-foot shaft, sunk some 700 feet from the great blow-out or chimney, has to a great extent done the developing mentioned above.

The tunnel which taps the vein is driven in the hill about the centre of the three first mentioned claims and taps and cross-cuts the vein fifty feet from the surface, where the vein continues its course as on the surface, a little west of northwest, and at that point I find the vein between walls to be 17 feet. It is true, a large amount of slate (all of which is highly metaline) is more or less intermixed with the quartz in the vein.

The greater portion of the ore at that point is white quartz, which carries about \$3 per ton of gold; yet in many places the ore is heavily charged with sulphurets which assay from \$3 to so high as \$120.70 per ton: while the entire mass of the vein is highly colored with copper stains, which is indicative of a strong and living vein. You could not have done otherwise than continue your shaft below the level of the adit, with such encouraging prospects and assurance of developing a good mine.

I carefully examined your waste dump that came out of the shaft, as well as the ore now in the ore-house, and the discarded ore, which had been thrown out as refuse. I made one assay of the waste dump, and two from the refuse ore, while I carefully sampled the ore in the ore-house, from which I made three assays.

My assay from the waste dump showed \$6.20 per ton, while it is quite possible that some will assay much higher, while other samples will only show traces of gold; yet I think eventually it will all be milled.

The two assays from the discarded ore went \$4.30 and \$47.03 respectively, while the samples from the ore-house assayed \$14.20, \$86.03 and one traces of gold only. I made several other assays, which I kept no note of. I made them in order, if possible, to ascertain which particular class of sulphurets carries the gold, as in some of my assays of ore from different mines, the show is very encouraging, while in others the showing of gold is small while the ore looks equally good.

You are no doubt aware that the vein is not exposed by any work done on the St. Laurent or American claims, yet beyond a doubt the vein is continuous, and not only passes through the

claims but also far beyond, as is evidenced by the work done in the Pinkerton shaft, some 3,000 feet northwest from your shaft.

True, the work in that shaft only exposed a small, or *supposed small*, vein, the ore from which shows about the average amount of gold shown in the ore taken from the Cariboo shaft. As regards the narrowness of the vein at that point, it can be accounted for, in two ways; first, it is true the ownies cut through the ore, coming to a *supposed* slate wall, but it is quite possible, had they cut through the slate more ore would have been found. (See report to government.)

Yet, I will admit, it is possible that they did cut through all the ore that existed at that point; but it must be remembered that veins do not continue the same width to great distances, and even where they do continue the same width between walls, they do not always carry the same width of ore; nor must you be surprised in working your mine, to sometimes come upon places in your vein which do not carry any ore at all; but your mine is, however, safe if you continue to have good walls.

Thus the necessity of keeping a mine well prospected and open, in advance of the capacity of the reduction works, not only to insure a steady supply of ore but to guard against delay in case of an accident in any part of the mine. Returning to the southeast end of the St. Laurent claim, no work has been done to expose the vein; yet it can be traced where it crosses Stout's gulch, and again at the canon, as it passes up through the "Black Jack" hydraulic claim towards the Wilkinson, and old Prosperine claims and *not* making an angle and passing below the old Cooper shaft and to the Vivian claim as formerly supposed.

In fact, so far as developments have been made on the mines of this district, your vein *surely deserves* the name *it is known by*, viz., "Bonanza." Some would go so far as to assert that you have a great mine; I cannot do so. I will, however, go so far as to say that your showing is exceptionally good. Few mining men in any country have such encouraging prospects upon which to commence operations. The increase in the percentage of the sulphurets denotes a continuance or permanency of the vein. You will not be likely to find such a high percentage of sulphurets in all the workings of the mine, any more than you will always be likely to have a 22 foot vein, yet sufficient can be seen to justify the erection of permanent hoisting and pumping machinery.

I find amongst your machinery, power sufficient for a 40-stamp mill, with sufficient power to spare to drive the necessary concentrators.

The pans, and immense amount of accompanying machinery, are useless in this district. A very small percentage of the gold will be saved in the batteries and outside plates. The pulp must then pass over concentrators, where from 70 to 80 per cent of the sulphurets are gathered; they must then be roasted in order to de-sulphurize them, when they are then chloridized. The process is not so expensive as continuous amalgamation (pan process), as the original cost, including freight, engine power, steam to drive them, wear of pans, shoes, etc., makes continuous amalgamation in a district like this extremely expensive. True, you lose the use of your pans but you gain power for 20 more stamps, which, with your mine, I think a great item, as I deem it advisable to *crush* all the ore as it comes from the mine, as it is a very difficult matter to select gold quartz unless you know that you are passing through a barren place in the vein. There are three kinds of concentrators now in use in California, the True, Challenge, and

Golden Gate, all good. I, as others, have a choice. I must not neglect calling your attention to the fact that the greatest care should be taken of boilers in so remote a district as this; not alone in order to save the cost of buying and shipping, or repairing, but because when a boiler has to be repaired or replaced, either the mine must close down and fill up with water, or the mill hang idle, which always means a stoppage of income while expenses go on. I recommend that all boilers in this district have attached to them a Llewellyn filter and heater (Address J. M. Streeten, rooms 7 & 8; 330 Pine street, for circular), universally used in San Francisco and the largest mills in the country. There may be others equally good, but they are not in use in California.

I can say but little in reference to the Wilkinson claim. I have been to the mine four times and fail to find any cause to change my original opinion of the ground: I can say nothing to justify but one opinion, and that is, that it is a continuation of the Bonanza vein, and while nothing positive can be said as to the width of the vein at that point, sufficient has been shown, by work done on that claim, as well as on the Prosperine (some 400 feet to the south-east), to justify me in thinking the vein is large and strong at that point.

The Wilkinson shaft has caved so badly that it would be folly to re-open it. I find many tons of ore on the dump, all of which is heavily charged with gold-bearing sulphurets, while the slate which comes from the vein at that point, as well as from the Prosperine shaft, (which is a hundred feet deep), is also highly metaline. While the assays do not go so high as some of those of the Cariboo, they are more uniform, even the slates showing well in gold, by assay. It would not in my judgment, be hazardous to prepare for and sink a good working and pumping shaft on the mine. Developments at the bottom of the 100-foot shaft, on the Prosperine mine, justify that conclusion. I consider the property valuable.

I will state, however, that in my judgment some considerable depth must be obtained before the vein will be found well in place, or so snugly encased in true walls as our California mines are usually found, and indeed I may say the same of the Cariboo; yet thousands of tons of pay-ore will be milled before the above-mentioned point is reached.

I have just had the pleasure of going to the bottom of your shaft on the Cariboo claim, which I find to be fifty feet deep from the level of the adit, making one hundred feet from the surface, or from the point where the vein crosses the surface in its course from the great blow-out toward the Lowhee creek and through the American claim.

I find the shaft has an irregular dip, but from top to bottom has an angle of about sixty-five degrees. At the bottom I was not surprised, after viewing the vein during my descent, as nothing but quartz thickly interspersed with sulphurets is visible on all sides.

I find the vein to be well encased in true walls at the bottom, except that the quartz seems to have an inclination to reach out in the hanging wall. The vein is twenty-three feet wide at the bottom and doubtless will continue to be that, or perhaps increase in width as depth is attained. I find about eight feet of the vein next to the hanging wall highly impregnated with sulphurets of the same general character as those in the ore house, which evidently came from the bottom of the shaft; also about four feet of the ore on the foot wall almost identical with that on the hanging wall, while the remaining portion of the vein

seems to be composed of white quartz, evidently of a low grade, yet containing some sulphurets. I consider the outlook extremely encouraging, and have sampled it for essays. Depth will, beyond doubt, make a great improvement in the value of the property.

I consider the selection of your mill site a very poor one, and refer you to my report to the government on that subject; also to the subject of manager, which, next to the mine, is the all important point to insure success. You will recollect that, while many gold mines pay uniformly for hundred of feet in depth, that it is extremely difficult to sample a gold mine and say what it will mill per ton, and more particularly in a sulphuret mine, as often within the space of one foot two samples may be taken, one showing traces of gold only, while the other may assay several hundred dollars per ton. I also find that even in the sulphuret ores of this district, spots will be found some distance from the surface where the showing of free-gold exceeds that which is locked up in the surrounding sulphurets. That must not lead the miner astray and cause him to think he can save the gold without concentrating, for, while such spots may frequently occur, yet all the mines so far discovered in this district are strictly gold-bearing sulphuret veins. I do not advise you as to the manner of commencing the work on your mines, as when you decide to commence operations, you will doubtless secure a practical man as manager. I remain, very respectfully,

Yours, etc.,

GEO. A. KOCH.

Our Mining and Mining Laws.

BY EUGENE COSTE, M.E.

While engaged during the last two seasons, on behalf of the Geological Survey of Canada, in the examination of several mining districts in different parts of the Dominion, I have been impressed by the unsatisfactory state of the mining industry in these districts, the unbusiness like way in which the work is carried on at most of the few mines that are being developed, the consequent immense loss to the country, and the apparent want of laws and regulations for the encouragement of real mining and the development of our great mineral wealth.

As these things forced themselves upon my attention day after day in the course of my inspection, the following questions suggested themselves: Why so little mining activity in this country so rich in mineral resources, and in which so many mining regions have long since been discovered? Why so few real mines and so meagre a production of ore? Why have so many mining schemes failed, and why, in several parts of Canada, have good mines been abandoned, which will eventually be worked again with profit? How explain that several mining districts, where splendid discoveries were made years ago, are yet comparatively unexplored, and that the true value of these districts is still unknown?

In trying to answer these questions, which concern one of the great sources of wealth for our young Dominion, I am led to the following conclusions: If our ore production is so meagre and if we have so few real mines, it is because, in the provinces of Ontario and Quebec and in the North-West territory, where the districts which I visited are situated, the laws allow speculators to purchase very cheaply large tracts of "mineral lands" which they are not compelled to work and which they hold, against the interest of the mining industry and of the country, awaiting

fabulous prices for them and so preventing *bona fide* working companies from developing them. This is evidently the reason why so many mining schemes have failed; they were only schemes of speculators trying to make a show, and with that object in view, instead of first opening the ground to ascertain its value, as a really good practical miner would have done, they have built handsome residences and villages in the woods and have done no mining for fear the indications would "play out." It is also the reason why many companies having bought, at very high figures, from these speculators, entirely unprospected mining locations, are deceived as to the value of the property, or, in case the property happens to be good, are nevertheless too poor to work it profitably after so great an outlay of capital to purchase it from the speculators. It is because these owners of "mineral lands" put extravagant values on them, and are, in consequence afraid of the truth and fear the results of complete investigations, that our mining districts remain unprospected, on the surface as well as underground, and that we cannot arrive at a knowledge of their real value.

I shall confine my remarks to the Dominion lands and the Provinces of Ontario and Quebec, where the mining districts I have visited are situated, and shall first endeavor to demonstrate how fatal to the mining industry is the system in force under existing laws and how necessary it is to abandon the custom of selling mining properties or the mining rights if the speedy development of the already known as well as the yet unknown mineral resources of the Dominion is desired. I shall further endeavor to indicate the principles which should be borne in mind in framing laws and regulations for the disposal of mineral deposits and the encouragement of mining in new countries.

A *résumé* of the laws now in force, over the Dominion lands and in the provinces of Ontario and Quebec, or at least of as much of these as concern the acquisition of the mining rights is here indispensable.

DOMINION LANDS.

The following are the mining regulations which govern the disposal of "mineral lands" other than coal lands:

Any person may explore vacant Dominion lands, either by surface or subterranean prospecting.

A mining location, except for iron, shall not exceed 40 acres, the length not being more than three times the breadth; the boundaries beneath the surface being the vertical planes in which its surface boundaries lie.

For the mining of iron, the Minister of the Interior may grant a location of 160 acres.

Having marked the location, the occupant, on paying \$5 in registering the claim, shall have the mineral right for one year.

During that year, at any time, he can purchase at the rate of \$5 per acre, cash, if he proves he has expended \$500 in actual mining operations on the claim, and if he makes a \$50 deposit, with the agent of the Government, for the survey of the claim.

For "placer" mining (gold alluvial digging) every person, holding a receipt renewable every year, can take up only one claim of about 100 feet square in the same locality, and this claim must not remain unworked more than 72 hours at a time.

A royalty of $2\frac{1}{2}$ per cent is reserved to the Crown on the sales of the products of all mines.

As regards coal mining lands:

They are periodically offered for sale by ten-

der or public auction—the lands within the "Cascade coal district" at an upset price of \$20 per acre cash, and the lands within all the other coal districts at an upset price of \$10 per acre, cash.

Not more than 320 acres shall be sold to one applicant.

Competition is invited when there is more than one applicant for the same location.

The regulations do not refer to the mining rights under lands already appropriated, or under lands which may be sold in the future not as "mineral lands," but under which mines may at any time be discovered, the mining right in these cases it is to be presumed belongs to the owner of the soil.

ONTARIO.

In the Province of Ontario we have the "General Mining Act" (Rev. Stat. 1877, ch. 29), of which the following is a *résumé*:

Any person may explore on any Crown lands not occupied.

Crown lands supposed to contain mines or minerals may be sold as mining locations, or may, when situated within any mining division, be occupied and worked as "mining claims" under "miner's licences."

The dimensions of the mining locations are 320, 160 or 80 acres. The price to purchase them is \$1.00 an acre in the territory north or north-west of the river Mattawa, lake Nipissing and the French River.

The price for the other parts of the province is not stated in the Mining Act but is, I am informed, practically the same.

The "mining claims" have an area of about one acre.

Any person possessing a "miner's licence," renewable annually for a fee of \$5, can occupy and mine one claim only at a time, on condition that it is worked within three months after the registration, and thereafter does not remain more than 15 days unworked.

The discoverer of any new mine shall be entitled to two mining claims.

QUEBEC.

In the Province of Quebec the mining rights are dealt with in the "Quebec general Mining Act of 1880" amended in 1881, 1882 and 1884.

The following is a *résumé* of the parts of this act relating to the acquisition of mining properties or mineral rights.

A licence renewable annually (fee \$2) is necessary to prospect on the vacant lands of the province.

The mining rights under all the lands of the province belong to the Crown, even for the lands appropriated before the passing of the act, except when the "lettres patentes" give in full the mining right.

The mining locations are 400 acres or less, but the Lieutenant-Governor in council may increase the limit to 800 acres.

The prices are, surface and mining rights inclusive, \$1 per acre for all minerals except gold, silver and phosphate (apatite), and for these \$2 per acre.

Every person working a gold or silver mining location must take a licence costing \$2 every three months (even if he has bought that mining location).

The owner of the surface, who desires to purchase the right of working a mine under his land, must pay per acre the difference between the rate he has already paid and the rate fixed for mineral lands and as stated above.

In case of gold and silver the "lettres patentes" will only be given after the sum of

\$200 has been expended in working the mine; two years are allowed to do this; but, after that time, if the \$200 are not expended the location may be deemed forfeited.

The Lieutenant-Governor in council may claim a royalty of $2\frac{1}{2}$ per cent on all gold and silver obtained and of 50 cts. per ton for phosphate.

The right to mine, for gold and silver, can also be acquired by licences allowing every person to take up one claim only at a time. These licences are of three kinds, *viz*:—

1. To work under appropriated lands: cost \$1 per month per miner.

2. To work under public lands: cost \$2 per month per miner.

3. To work under mining locations, granted and not being worked, or not granted: cost \$2 per three months.

The dimensions of these "claims" are: for alluvial mines about 100 feet square, and for quartz mining about one acre. They must be worked within four weeks after registration and must not thereafter remain unworked for more than 15 days at a time.

A discoverer has a right to a free licence in force for twelve months and to a claim of the largest size.

The amendments of last year (1884, ch. 22) have recognized the principle of underground rights being separated from the surface rights. They state that underground right may be bought or leased or that they may be acquired by a licence, (the owner of the surface having the first right to acquire); but, the price, the shape and the dimensions of these underground mining locations are not stated. These are to be decided by the Lieutenant-Governor in council.

In considering with attention these *résumés*, it will readily be seen that these laws give the three following results: I. A surface owner possesses or can buy first the mineral rights and is not compelled to work the mine. II. Very large tracts of "mineral lands" can be bought from the Crown lands without any obligations to develop these "mineral lands." In Quebec, however, when these lands are unworked, the Government may grant small claims over them, in the case of gold and silver, but without forfeiting for that the "deeds" of the owner. III. Rights to mine under small claims can also be acquired in certain cases by a licence.

III. The few following remarks may be offered in reference to the system of granting these small claims: it only retards the acquisition of many mines by good companies; it is the cause of a number of disputes on the question of possession of property; and, in some cases, it might cause also the entire spoiling of a good mine. These claims are very much too small and the working of the mines in these cases, being on too small a scale, is never satisfactory. There is nothing really practical in this: and it is only as applied to placer mines that it is good and useful, and this is the only case in which an individual miner can work a mine and make it pay.

I & II. But, it is desired especially, in this report to direct attention to the two first results indicated above of our existing mining laws. The backwardness of our mining industry has been a natural sequence of the recognition by the laws of these systems of giving mining rights to surface owners and of selling "mineral lands;" that alone impedes and even prevents entirely in certain districts the development of the mineral resources; and, until the mining laws are changed and another and entirely different system adopted for the acquisition of mineral

deposits, we shall have, as we have now, but few mines working.

First, indeed, prospecting is discouraged. It is evident enough that the buying up of large tracts of "mineral lands" brings that result, because prospectors are not to be found who will search on granted lands in a vast new country like ours. Surface owners, having mining rights or first rights to acquire, also discourage prospecting, because then, when a mine is found under granted lands, it does not belong to the explorer, to the man who has discovered it, but to a settler who has been working his soil for a long time perhaps, without having ever had any knowledge of the existence of this mine, or to a speculator who, as a rule, has never put his foot on the land. Nevertheless, what right, in justice, have these people to this new property which they did nothing to find and which an explorer brings to light by his exertions after long, patient and very often in this country, tedious research? Suppose it is for instance a vein 2,000 feet long with an average width of 3 feet 4 inches, dipping at a regular angle of 45°, and that the specific gravity of the ore averages 3.5. In these conditions, a simple calculation shows that the vein, being worked to the depth of 1,000 feet and under 23 acres of the surface (2,000 feet on the length of the vein, by a width of 1,000 feet on the side of the dip), will give about 1,000,000 tons of ore. If then a profit of say \$1 per ton can be made on the ore coming from that mine, it is seen that the profit to be made or the real value of the portion of the mine above the depth of 1,000 feet is \$1,000,000. Such is the fortune an explorer has discovered, that he alone indicates and creates, you may say, after perhaps many months or years of arduous tramping. Surely he ought to have some right to a portion at least of that fortune; and yet, the surface owner deprives him of it.

But, if by natural right and law, this property should not belong to the surface owner, it much more ought not to belong to him for political and economic reasons, and for the same reasons, the selling of "mineral lands" ought not to be authorized by our laws. Because, if it tends to lessen the number of discoveries, it also, as second result, prevents the development of the mines once discovered.

A vein, indeed, being discovered on the surface, one must make sure that it keeps going down, that it does not narrow until it becomes unworkable, as is often the case, that the percentage of good ore remains large enough in the vein, that the difficulties of working, due to water or other causes, will not be too great, etc., etc. All this must be known before it can be said that a good mine exists, and to ascertain this, the vein must be explored underground by shafts and levels. This is expensive work, much more so than is generally known, and it may cost many thousands of dollars, always several thousands. It is also a very difficult work, often exceedingly so, and even the best scientific and trained mining engineers sometimes make mistakes, and every mistake costs a great deal of money. Is not then an incompetent man almost certain to make a failure of it? Who is going to do that work of testing the ground? Evidently not the settler, for if he has the misfortune to try it, he will spend every year more money on small excavations sunk in all directions, than the cultivation of his land can yield him, and he never will know how to do the work, and at what results he has arrived, if he arrives at any. The district of North Hastings (Ontario) is pierced everywhere by small excavations such as I have mentioned, sunk by settlers under their lots. I

have visited many of these excavations and in most of them I failed to find a trace of ore, though they represent a large amount of time and money lost, and, many farmers neglect their farms on that account. If the farmer tries to have the work done for him, it will always be on too small scale and is in consequence doomed to failure. He will probably give the work to a so called "old miner" just arrived from California, Australia and Cornwall. This man knows it all; he will tell the farmer every night that he has done excellent work during the day, that no doubt it is a wonderful mine, that he sees an immense treasure ahead of him in the level or in the shaft, that, true, the expense has been great and nothing has yet been found, but wait, next day he will strike the lead and show him the treasure; and this goes on from day to day until the poor settler is compelled to give it up. And yet, he still believes in his wonderful mine!

It is with the same result generally that the speculator tries to work his lot, his object being only to develop it sufficiently to affect a sale.

Mining engineers and mining men supported by capitalists alone are able to take up these works of newly discovered veins underground exploring. They alone can develop that fortune discovered by the explorer. Why then are these new discoveries allowed to be or to become the property of persons who acquire them either by accident or only for speculative purposes?

If mining is a difficult matter requiring specially trained men; if it is an expensive work requiring a great deal of capital; it is also, so long as a thorough underground prospecting has not been made, a very uncertain business to go into especially in a new country where there is no comparison with neighbouring mines to be made. Mining men know that, they know that a good vein may pass at any moment to a bad one, and in consequence they will never pay, on the evidence merely of the outcrop of a vein, the enormous sums of money asked by the owners of soil. They are willing to run the chances if they have not to pay too high a price for the property; but under the present conditions, they will not try it. They will leave mining districts disheartened, not that they find the district worth nothing, on the contrary, they see there brilliant prospects, but what can they do? They find all the properties bought, all the mining rights acquired and everybody asking them enormous sums, cash, before being allowed even to explore the mine by shafts and levels. And yet this district is very little worked, and though good and discovered many years ago, nothing is to be seen there except shafts full of water and abandoned excavations, remains of the meagre efforts made by the owners of the soil and the speculators to develop their deposits just enough to make a show in order to sell the property.

I may say then, in conclusion, that it is quite necessary in the interests of our country, in the interest of our mining industry which once developed will perhaps give us the millions that our neighbours of the United States have taken out of their mines and on which is based much of their prosperity, that the mining properties should be held as national property regulated by good laws and leased permanently and directly to *bona fide* mining men, on conditions including forfeiture when sufficient work on them is not being annually done.

Why not, indeed, prevent a farmer or speculator from imposing a heavy charge on a mining company willing to run the risks of exploring and working a mine? Why, for what purpose, should the laws place between the government and the real miner, this surface owner, who, with his often primitive and exaggerated ideas of

mines, does not consider the enormous expense and the uncertainty attending the work of underground mineral exploration nor the large capital required for the subsequent regular working of a mine, and will always add to that a formidable demand for money before even allowing explorations to be made on his property; this property having been bought from the Government at \$1.00 an acre and on which he did nothing himself to discover the mine? I say a formidable sum, because I know of many instances where twenty, thirty and even one hundred thousand dollars have been refused by such owners of the surface.

The Canadian government protects many industries, often bonuses are given, the development of our agricultural resources is encouraged: why not also protect our mining industry? To day, before sale, surface rights and mining rights are the property of the country, and the country, in the interest of our mining industry, instead of giving away these rights for a few dollars an acre, should carefully guard the mining right by good legislation, because good mines are rare golden eggs which a nation must protect with great care. A large country like ours, indeed, has so many millions of acres of good lands that land speculation, though very prejudicial, can be overlooked; but, as regards mining, it is very different. Such a thing as "mineral lands" extending over large tracts of country does not really exist; and nature has been more parsimonious with mineral deposits than speculators suppose when they buy thousands of acres in a district thinking they have a mine under every lot. No! good mines, even in a very large country, are always scarce, for geological reasons (mineral deposits geologically being only accidents), for technical reasons (many deposits not being valuable because of the great difficulties of mining them or of treating the ore), for economic reasons (mineral substances being often found too far from market, or from a railway, or being in too small quantity), etc.; then, once a good mine is discovered, its permanent working by a good company should be encouraged and assured. To attain this end, the country must keep the mineral rights in its hands so as to be free, when a mineral deposit is found anywhere, to give the right to mine it to a good company, and if this right is given without charge of any sort before profit is made, it will assure those going to work every possible chance of success and it will encourage capitalists to try and develop every place where the surface indications are good, because the only money to risk will be the necessary money to test the ground. It is but just, however, that the laws should oblige these capitalists, from the day they make a profit, to suitably remunerate the original discoverer. In that way, instead of having thousands and thousands of acres of so called "mineral lands" bought* and lying for years and years unprospected, unworked and in no way profitable to anybody, we shall see on the contrary, here and there, some mines actively worked expending vast amounts in the country, bringing workmen in, creating around them villages and towns; and every one of these mines will be more benefit to the Government and to the country than thousands of granted mining locations undeveloped and not only useless from a mining point of view, but doing much damage to the other interests of the country and often to the speculators themselves.

*See "Plan of part of the North shore of Lake Superior showing Thunder and Black bays, etc.," published in Toronto, 1st August, 1883, (department of Crown Lands), and showing how much "mineral land" is taken up in that region.

As will be seen from the following suggestions which I venture to make in conclusion, nothing could be easier than to change entirely the old system of selling "mining lands" and to attain the results just stated. The national mining property would then be submitted, in its general outlines, to the same kind of administration that has been adopted: in France by the mining law of the 21st April, 1810; in Austria by that of the 23rd May, 1854; in Italy, except in the southern provinces, by the royal warrant of 29th November, 1859; in Prussia by the general mining law of 24th June, 1865; in Bavaria by the law of 20th March, 1869; in Spain by the laws of 6th July, 1859, and 13th July, 1867; in Turkey by the regulations of 3rd April, 1869; and in Greece by the laws of 1861, 1867 and 1877.

PRINCIPLES WHICH SHOULD BE FOLLOWED IN DETERMINING THE CONDITIONS UNDER WHICH MINING RIGHTS SHOULD BE ACQUIRED AND MAINTAINED.

1. Encouragement of explorations:

By recognizing and giving a right to the explorer on the mineral deposit that he discovers. This right should be in proportion to the value of that mineral deposit and consist in consequence in a certain annual royalty on the profits made out of the mine (say 5 per cent of these profits). This rent or royalty will be due every year in which profits are made by the lessee and until the death of the discoverer.

By further giving to the discoverer, if he wish, time to organize a company himself to lease and work the mine—say six months or nine months after the registration of his discovery.

2. Prevention of mere speculating and encouragement for the formation of *bona fide* working mining companies. For that purpose the mining right must be declared entirely independent of the surface right, and this mining right must not be sold, as to do so allows speculators to buy at very low figures large tracts of "mineral lands" which they retain without working them and which they sell only at very high prices; thus delaying the development of our mining industry and hindering the surface and underground explorations; and, the value of our mining districts remains unknown, which is very damaging in an immense new country like ours where the discovery of very rich mining districts may be anticipated every day.

By giving to every one offering sufficient guarantee, when a discovery has been made and when he is first to apply for it, a permanent lease (disposable and transferable as in the case of any other property) of the mining right under the area of land asked for by him, subject however to the following conditions:*

(a). The lessee shall pay to the discoverer the royalty stated above except if they can agree upon a fixed sum to be paid in the first year of the lease.

(b). To prevent the monopoly of mining rights on too large an extent of lands, larger than can be worked actively to the best interest of the country, that is to say, so as to restrict the areas under which mining rights will be leased to companies within reasonable limits, and to prevent companies from acquiring mining leases simply with the idea of speculating in or selling them at a given time, which would, like the system of to-day, ruin the mining industry:

The lessee, commencing 6 months after the day of the granting of the lease, shall pay an annual penalty of \$100 per acre of land under which the mineral substance shall not have been

during that year sufficiently worked. Every acre will be considered as insufficiently worked for which an annual average sum of \$100 shall not have been expended. This annual average expenditure will be arrived at in taking into account in the total all expenditure in any work connected with the mine; this total divided by 100 will give the number of acres of the lease sufficiently worked.

Every person having a lease will be permitted to relinquish it on demand, but so long as he retains it he will be subject to the above conditions.

If this penalty (b) is not paid within six months after becoming due the lease shall be considered forfeited.

(c). The lessee shall be entitled and obliged to buy a sufficient area of land necessary for the surface requirements of the mine (plant, offices, dumping grounds, etc.); but, no more than is absolutely necessary if the owner of the soil has no objection: the prices being the ordinary price of the Crown Lands department if on public lands, or being fixed by arbitration, at the ordinary prices of lands in that locality, if on appropriated lands.

(d). All mines shall be subject to inspection by duly appointed officers of the government so as to assure the proper working of the mine according to the conditions of the lease, the preservation of the surface—always endangered by subterranean works;—and also, the safety of mining workmen and the due enforcement of the laws and regulations respecting mines and minerals.

MINING NOTES

Nova Scotia.

The Springhill mines, says the *Herald*, continue to boom. The output has now reached 40,000 tons per month, or say at the rate of 50,000 tons a year. We take pleasure in calling the attention of the dismal-doleful organs to the fact that this is only a little less than the total output of Nova Scotia mines a few years ago. The output at Springhill is only limited by the existing capacity to supply.

Some very interesting facts regarding the Londonderry Iron Mines, their failure, and its causes, may be gleaned from the following excerpt taken from a very able review of our iron industry given by the *Montreal Star*:—

In the forests of the Cobequid Hills, in the Province of Nova Scotia, miles away from any road or settlement, a vein of iron ore was years ago discovered. Geologists visited the locality and pronounced the deposits of great extent, and a grant of land was obtained from the Government. A Catalan forge was built in 1850, and three years later a small blast furnace was put up, charcoal in both cases was used as fuel, the trees from the forest around being made into charcoal. A small stream ran past the iron mine and was made to drive the blast engine. The iron ore was very pure, so the pig iron made was of superior quality; there was no home market, but it was exported to England, although the iron had to be carted to the nearest shipping point, namely Great Village, six miles away from the furnace, and situated at the entrance to a small tidal river on the Cobequid branch of the Bay of Fundy. Navigation on the upper end

of the Bay of Fundy is dangerous; the tides which here rise to the height of 71 feet, rush in and out with great rapidity; the river could only be entered at high tide by vessels drawing not more than 12 feet of water, and the navigation to the entrance of the river was bad. The construction of the Intercolonial Railway, which eventually was brought within three miles of the furnace (at the expense of permanently lengthening the main line by five miles, and unfavorably affecting the gradients and curvature) made the place more accessible. It was still only a little hamlet in the midst of the forest, but it was self-contained, having plenty of ore and timber for making charcoal. There was a demand for the iron, as owing to its superiority the English War office, upon the recommendation of Sir William Fairbairn and others, were using it for the manufacture of ordnance. This was before the age of steel, and, no doubt, the iron commanded a large price, and, altogether, the works were remunerative to their owners.

In 1873, the Acadia Iron Mines, as they were then called, were purchased by a company of a few English capitalists having Sir William Siemens at their head with a capital of two and a-half million dollars. Their intention was to make steel directly out of iron ore by a new patented process, invented by Sir William Siemens and also to make coke, pig iron, etc. This the Steel Company of Canada, had its headquarters in England, and managed the Londonderry business from there. They paid 40,000 in cash and \$60,000 in paid up stock for the Acadia Iron Mines, also \$40,000 for the patent rights, a total of \$1,040,000.

The accidental location of the little charcoal blast furnace seems to have given rise to the choice of the situation for the new works. It would be difficult to account for the selection in any other way. Works specially designed for the new patented process, with rotators, melting furnaces with a regenerative gas producers, two blast furnaces, branch railways to the Intercolonial Railway, and the different ore mines, houses, buildings, etc., etc., were built. The scale on which the expenditures were made can best be understood by reference to the item of cost for the manager's house, which came to \$40,000.

The works were completed and got into operation probably at a further expenditure of about \$1,250,000. The new process did not seem to do very well, and after costly experiments and repeated trials, it eventually proved here, as elsewhere, a complete failure. Hundreds, perhaps thousands, of tons of expensive machinery had to be broken up, and the melting furnaces and regenerative gas producers were pulled down. A second-hand rolling mill was purchased and some puddling furnaces built, an axle forge with a foundry for car wheels an general castings added, and the product of the works changed from steel to pig iron, bar iron and castings. The place was not now self-contained as before; charcoal was no longer the fuel used, so the trees were of little use, except for timbers in the iron mines. What was wanted was coal and coke, and although at the time of the purchase, coal was supposed to be on the property, it has never yet been actually discovered. The coal field of Pictou is 51 miles to the eastward, that of Cumberland, 43 miles to the westward. Limestone in considerable quantities is required and is obtained from Brookfield, 25 miles to the eastward. When, after having paid freight on all these materials, iron is made out of them, there is no outlet but by the same Intercolonial railway, the distance by rail to Montreal being 773 miles.

*That would place a lessee on the same footing as an owner in fee simply would be, excepting the condition of working the property necessary to prevent speculation.

The condition of affairs was had enough but the situation was made much worse by the fact that the company had never built any coke ovens of their own, and that at this time only one colliery mined a coal suitable for coking, and also owned the only coke ovens in the country, they consequently supplied coke at their own price, helping materially to kill the goose which laid the golden egg. One day an explosion took place in this particular mine, set the mine on fire, and closed it. It has been closed ever since. For a time coke was not to be had for the iron mines at any price, the blast furnaces had to be shut down, and the loss from this cause alone can be better imagined than described. After this experience some coke ovens were built, and to some extent this has made the company independent, finally a coal mine was purchased and fully equipped, but upon practical trials, the coal was found to be to some considerable extent unfitted for their uses. It was also discovered that owing to an arrangement to have their iron ore mined by contract, that the contractor had made money for himself but had permanently ruined one of the iron mines.

Instead of running a general store from which a considerable revenue would accrue, some outsider was granted the privilege and took advantage of it.

Is it surprising that after all these vicissitudes and bearing in mind the fact that until 1880 imported pig iron was admitted free of duty into Canada, that the company failed. It is more to be wondered at that they struggled on as long as they did.

In 1880 an import duty of \$2 per ton was imposed, and in 1883 a bounty of \$1.50 per ton of pig iron manufactured out of Canadian ore, was granted by the Dominion Government. Under these improved conditions, the company's operations were continued by the liquidators. It is to be hoped that a re-organization will be effected, the management centred in Canada, and the enterprise made productive to the proprietors and the country at large. Under a careful management, there can be no question that a satisfactory dividend can be earned, upon the expenditure of the works as they stand.

It is manifestly unfair to condemn every projected iron making enterprise in Canada, simply because in the past this particular case has not succeeded. In spite of all their troubles the pig iron, bar iron and other products of the London-derry works have been of a very superior quality and have always commanded the highest price in the market.

Quebec.

An assay of the ore taken from the Belvédère deposit, in the vicinity of Sherbrooke, has been made by Mr. Hoffman, of the Geological Survey, and is reported to give 28.29 per cent. of metallic iron.

An exchange says the lead mining property on Chatt's Island, owned by Captains Cowley and Murphy, was last week sold to Mr. James Robertson of the Montreal Lead Works. Mr. Robertson intends to have the land surveyed into small sections and placed upon the European market without delay. The property contains nearly one thousand acres.

We understand that Mr. F. Stacy Shirley has been appointed manager to the Du Lievre Milling and Mining Company, at Bassin du Lievre, vice Mr. Geo. H. Bacon, resigned. This company, which has been frequently erroneously referred to as Messrs. Bacon & Co., own the Lievre phosphate property, and we learn that the

investors are now taking hold of the mine, and commence active operations at it as soon as the weather will permit them doing so profitably.

Messrs. G. H. Nicholson & Co., of New York, proprietors of the Albert mines, have purchased from the Eastern Townships Bank, together with all the movables, the Hartford and Capel mines. This property was owned and worked for many years by the Canadian Copper and Sulphur Co., Limited, but owing to financial difficulties they were obliged to close down some two years ago and the property was all acquired by the Eastern Townships Bank at sheriff's sale. The new owners will resume operations in the above mines at an early date.

Ontario.

The London correspondent of the *Montreal Gazette*, mentions two important assays of Canadian minerals having been made, one from the Sudbury copper mines, the other specimen was argentiferous lead ore from the mines of Mr. Edward Wright, situated at Lake Temiscamingue. It was found by dry assay, to contain of lead (metallic) 52 per cent of silver 13 oz. 14 dwts. 10 grs., per ton of ore of 2,240 lbs., or of silver 26 oz. 7 dwts. and 21 grs. per ton of lead of 2,240 lbs. This latter property is now connected with the Canadian Pacific railway by water and by tramway, and it is expected to prove of considerable value.

THUNDER BAY DISTRICT.

Work has been suspended for the present at the Elgin mine.

It is understood that negotiations for the sale of Silver Mountain West End property will soon be concluded.

An air compressor, capable of driving three drills, is in course of erection at the East End Silver Mountain mine.

The shaft at the Partridge Rock Silver Mine is now down about thirty feet. The indications for silver are reported to be most encouraging.

The *Miner* reports that a big strike of rich ore has been made at the Beaver mine. It has been made in the drift, beyond the shaft about 150 feet, and is of almost unexampled richness. About 350 pounds of ore have been brought into town which will assay from 1,000 to 2,000 oz. to the ton. The vein has been laid bare for about 18 feet of its depth and for about 400 feet long; it shows now 7 feet wide, and is uniformly as good as the samples all the way across.

The following are the directors of "The Consolidated Huronian Gold Mining Company of Ontario":—Horace J. Neville, G. A. Thompson and Alexander McEwan, of London, England; A. R. Gray, Edinburgh, Scotland; James McLaren, Buckingham, Quebec; J. A. Keefer, Port Arthur; and N. Kingsmills and A. J. Cathanact, Toronto. The capital stock is \$1,300,000, with an additional working capital of \$500,000. The head office of the new company will be at Port Arthur.

Manitoba and North-West Territories.

A member of the Geological Survey staff who has been engaged during the past season in the work of investigating the coal deposits of the Saskatchewan region states that the coal supply of the North-West is absolutely inexhaustible, and

that the whole district lying between Rocky Mountain House and Fort Pitt is one vast series of coal beds, both hard and soft, of the very best quality.

In the last Canada Gazette notice is given that Duncan McArthur, W. R. Allan, F. A. Fairchild, R. D. Bathgate, Archibald Wright and C. W. Betts, all of Winnipeg, apply to the Governor-in-Council for letters patent incorporating such applicants a body corporate and politic under the corporate name of "The Rocky Mountain Mining and Lumbering Company (Limited)," for the purpose of carrying on a mining and lumbering business within the Dominion of Canada, also for the purpose of said company, to build, equip and operate tramways, sailing and steam vessels for the carriage of lumber, timber, minerals or mineral ores or any other production by said company; to purchase, build and erect stamp mills, saw and planing mills, or any one or more thereof. The head office of the company will be at the City of Winnipeg.

Work is being actively pursued at the Saskatchewan coal mine. Some difficulty has been experienced owing to the scarcity of miners. The Hungarians who had been employed were found to be worthless, and had to be discharged, and operations are now being carried on by miners imported from Nova Scotia, who are working on a percentage. The present staff employed is 71 men and the daily output is 75 tons. The capacity of the mining machinery is 260 tons per diem, and as soon as the management can place their full staff to work, this is expected to be their daily output. Mr. W. M. Caldwell, of the firm of Caldwell & Keenan, under whose superintendence the work of development is being carried on, states that when they began work the mine had been neglected for about eighteen months, and it was covered with water to the depth of from 16 to 18 inches. The old company sank their shafts at the base of the hill under which the mine is, and did not work more than from twenty to thirty-five feet of cover. He had, however, run two shafts right under the hill and they are now working under a cover of two and three hundred feet. So far the shafts have run in 370 feet, and they are steadily going forward. He states that as they get deeper and deeper into the earth the coal continues to improve in quality.

British Columbia.

Mining operations in the Kootenay district have been suspended for the winter.

In another column is given a copy of Mr. G. A. Koch's report to the directors upon the mining property belonging to the British Columbia Milling and Mining Company.

A quartz nugget taken from Granite creek was recently sold to Mr. I. B. Fisher, of the Bank of British Columbia, New Westminster. It weighed 34 ounces, and after allowing 40% for quartz, is valued at \$340.00.

Work has been begun by awarding the contract for grading the site of the shaft house, and sinking 50 feet on the vein from the surface, to connect the present blind shaft, which is down fifty feet from the end of the tunnel, developing the vein 105 feet from the surface, where it crosses in the ledge, showing a vein of 23 feet in width between walls.

This Company, says the *Colonist*, was organized in 1878, during the quartz mining excitement, secured several locations on the Bonanza lode in Cariboo, near William's creek, and laid down at a cost of some \$75,000 a complete twenty stamp mill, rock crusher and sawmill. After the general collapse, which occurred in the fall of that year, caused by an undue inflation of mining stocks before any development had actually commenced, the company, feeling that further assessments upon the stockholders would be fatal to the interest of the enterprise, decided upon shutting down, preserving their machinery, and protecting their claims for further operations, when a more propitious state of mining affairs would warrant development, the directors and shareholders having every confidence in the value of their property and the ultimate success of the enterprise. The Directors of the Company, which possesses 4,500 feet on the Bonanza vein, known as the St. Laurent, American and Cariboo claims, and 1,500 feet on the Wilkinson, are: President, Mr. Joseph Heywood; Secretary, Mr. Geo. A. Sargison; and Messrs. J. H. Todd, J. H. Turner, C. E. Redfern, I. Oppenheimer, and Frank Barnard

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MINING REGULATIONS

To Govern the Disposal of

Mineral Lands other than Coal Lands,

1886.

THESE REGULATIONS shall be applicable to all Dominion Lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, iron, or other mineral deposits of economic value, with the exception of coal.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein, either by surface or subterranean prospecting, for mineral deposits, with a view to obtaining under the Regulations a mining location for the same, but no mining location or mining claim shall be granted until the discovery of the vein, lode, or deposit of mineral or metal within the limits of the location or claim.

QUARTZ MINING.

A location for mining, except for iron, on veins, lodes, or ledges of quartz or other rock in place, shall not exceed forty acres in area. Its length shall not be more than three times its breadth, and its surface boundary shall be four straight lines, the opposite sides of which shall be parallel, except where prior locations would prevent, in which case it may be of such a shape as may be approved of by the Superintendent of Mines.

Any person having discovered a mineral deposit may obtain a mining location therefor, in the manner set forth in the Regulations which provide for the character of the survey and the marks necessary to designate the location on the ground.

When the location has been marked conformably to the requirements of the Regulations, the claimant shall, within sixty days thereafter, file with the local agent in the Dominion Lands Office for the district in which the location is situated, a declaration or oath setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as aforesaid; and shall, along with such declaration, pay to the said agent an entry fee of FIVE DOLLARS. The agent's receipt for such fee will be the claimant's authority to enter into possession of the location applied for.

At any time before the expiration of FIVE years from the date of his obtaining the agent's receipt, it shall be open to the claimant to purchase the location on filing with the local agent proof that he has expended not less than FIVE HUNDRED DOLLARS in actual mining operation on the same; but the claimant is required before the expiration of each of the five years, to prove that he has performed not less than ONE HUNDRED DOLLARS' worth of labor during the year in the actual development of his claim, and at the same time obtain a renewal of his location receipt, for which he is required to pay a fee of FIVE DOLLARS.

The price to be paid for a mining location shall be at the rate of FIVE DOLLARS PER ACRE, cash, and the sum of FIFTY DOLLARS extra for the survey of same.

Not more than one mining location shall be granted to any individual claimant upon the same lode or vein.

IRON.—The Minister of the Interior may grant a location for the mining of iron, not exceeding 160 acres in area, which shall be bounded by north and south and east and west lines astronomically, and its breadth shall equal its length. Provided, that should any person making an application purporting to be for the purpose of mining iron thus obtain, whether in good faith or fraudulently, possession of a valuable mineral deposit other than iron, his right in such deposit shall be restricted to the area prescribed by the Regulations for other minerals, and the rest of the location shall revert to the Crown for such disposition as the Minister may direct.

The Regulations also provide for the manner in which land may be acquired for milling purposes, reduction works, or other works incidental to mining operations.

Locations taken up prior to this date may, until the 1st of August, 1886, be re-marked and re-entered in conformity with the Regulations without payment of new fees, in cases where no existing interests would thereby be prejudicially affected.

PLACER MINING.

The Regulations laid down in respect of quartz mining shall be applicable to placer mining as far as they relate to entries, entry fees, assignments, marking of localities, agents' receipts, and generally where they can be applied.

The nature and size of placer mining claims are provided for in the Regulations, including bar, dry, bench, creek or hill diggings, and the RIGHTS AND DUTIES OF MINERS are fully set forth.

The Regulations apply also to

RED-ROCK FLUMES, DRAINAGE OF MINES AND DITCHES.

The GENERAL PROVISIONS of the Regulations include the interpretation of expressions used therein; how disputes shall be heard and adjudicated upon; under what circumstances miners shall be entitled to absent themselves from their locations or diggings, etc., etc.

THE SCHEDULE OF MINING REGULATIONS

Contain the forms to be observed in the drawing up of all documents, such as:—"Application and affidavit of discoverer of quartz mine." "Receipt for fee paid by applicant for mining location." "Receipt for fee on extension of time for purchase of a mining location." "Patent of a mining location." "Certificate of the assignment of a mining location." "Application for grant for placer mining and affidavit of applicant." "Grant for placer mining." "Certificate of the assignment of a placer mining claim." "Grant to a bed-rock flume Company." "Grant for drainage." "Grant of right to divert water and construct ditches."

Since the publication, in 1884, of the Mining Regulation to govern the disposal of Dominion Mineral Lands, the same have been carefully and thoroughly revised with a view to ensure ample protection to the public interests and at the same time to encourage the prospector and miner in order that the mineral resources may be made valuable by development.

COPIES OF THE REGULATIONS MAY BE OBTAINED UPON APPLICATION TO THE DEPARTMENT OF THE INTERIOR.

A. M. BURGESS,

Deputy Minister of the Interior.



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DEPARTMENT OF INLAND REVENUE.

An Act respecting Agricultural Fertilizers.

THE public is hereby notified that the provisions of the Act respecting AGRICULTURAL FERTILIZERS came into force on the 1st of January, 1886, and that all Fertilizers sold thereafter require to be sold subject to the conditions and restrictions therein contained—the main features of which are as follows:—

The expression "fertilizer" means and includes all fertilizers which are sold at more than TEN DOLLARS per ton, and which contains ammonia or its equivalent of nitrogen, or phosphoric acid.

Every manufacturer or importer of fertilizers for sale, shall, in the course of the month of January in each year, and before offering the said fertilizer for sale, transmit to the Minister of Inland Revenue, carriage paid, a sealed glass jar, containing at least two pounds of the fertilizer manufactured or imported by him, with the certificate of analysis of the same, together with an affidavit setting forth that such jar contains a fair average sample of the fertilizer manufactured or imported by him; and such sample shall be preserved by the Minister of Inland Revenue for the purpose of comparison with any sample of fertilizer which is obtained in the course of the twelve months then next ensuing from such manufacturer or importer, and which is transmitted to the chief analyst for analysis.

If the fertilizer is put up in packages, every such package intended for sale or distribution within Canada shall have the manufacturer's certificate of analysis placed upon or securely attached to each package by the manufacturer; if the fertilizer is in bags, it shall be distinctly stamped or printed upon each bag; if it is in barrels, it shall be either branded, stamped or printed upon the head of each barrel, or distinctly printed upon good paper and securely pasted upon the head of each barrel, or upon a tag securely attached to the head of each barrel; if it is in bulk, the manufacturer's certificate shall be produced and a copy given to each purchaser.

No fertilizer shall be sold or offered or exposed for sale unless a certificate of analysis and sample of the same shall have been transmitted to the Minister of Inland Revenue, and the provisions of the foregoing sub-section have been complied with.

Every person who sells, or offers or exposes for sale, any fertilizer, in respect of which the provisions of this Act have not been complied with—or who permits a certificate of analysis to be attached to any package, bag or barrel of such fertilizer, or to be produced to the inspector, to accompany the bill of inspection of such inspector, stating that the fertilizer contains a larger percentage of the constituents mentioned in sub-section No. 11 of the Act than is contained therein—or who sells, offers or exposes for sale, any fertilizer purporting to have been inspected, and which does not contain the percentage of constituents mentioned in the next preceding section—or who sells, or offers or exposes for sale, any fertilizer which does not contain the percentage of constituents mentioned in the manufacturers' certificate accompanying the same, shall be liable in each case to a penalty not exceeding fifty dollars for the first offence, and for each subsequent offence to a penalty not exceeding one hundred dollars. Provided always, that deficiency of one per centum of the ammonia or its equivalent of nitrogen, or of the phosphoric acid, claimed to be contained, shall not be considered as evidence of fraudulent intent.

The Act passed in the forty-seventh year of Her Majesty's reign, chaptered thirty-seven and intitled "An Act to prevent fraud in the manufacture and sale of agricultural fertilizers," is by this Act repealed, except in regard to any offence committed against it or any prosecution or other act commenced and not concluded or completed, and any payment of money due in respect of any provision thereof.

A copy of the Act may be obtained upon application to the Department of Inland Revenue.

F. MIAL,

Commissioner.



Tenders for a License to Cut Timber on Dominion Lands in the Province of British Columbia.

SEALED TENDERS addressed to the undersigned and marked "Tender for a Timber Berth," will be received at this Office until noon on Monday, the 1st day of November next, for four timber berths of ten square miles each, more or less, numbered respectively 4, 5, 8 and 9, situated on Kicking Horse River and Ottentail Creek, a tributary of the Kicking Horse River, near Field and Ottentail Stations, on the line of the Canadian Pacific Railway, in the Province of British Columbia.

Sketches showing the position approximately of these berths, together with the conditions on which they will be licensed, may be obtained at this Department or at the Crown Timber Offices, Winnipeg, Calgary, N.W.T., and New Westminster, British Columbia.

A. M. BURGESS,

Deputy of the
Minister of the Interior.

Department of the Interior,
Ottawa, 14th August, 1886.



Tenders for a License to Cut Timber on Dominion Lands in the Province of British Columbia.

SEALED TENDERS addressed to the undersigned and marked "Tender for a Timber Berth," will be received at this Office up to noon on Wednesday, the 1st day of December next for three timber berths of fifty square miles each, more or less, numbered respectively 16, 17 and 18, situated on the west side of the Columbia River, near Golden City Station, on the line of the Canadian Pacific Railway, in the Province of British Columbia.

Sketches showing the position approximately of these berths, together with the conditions upon which they will be licensed, and the forms of tender therefor, may be obtained at this Department or at the Crown Timber Offices at Winnipeg, Calgary, N.W.T., and New Westminster, British Columbia.

A. M. BURGESS,

Deputy of the
Minister of the Interior

Department of the Interior,
Ottawa, 9th September, 1886.

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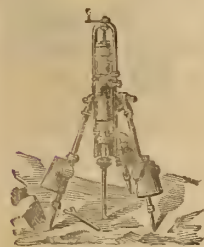
CANADIAN MINING REVIEW

Vol. 4.—No. 10—11.

1887—OTTAWA, JANUARY—FEBRUARY—1887.

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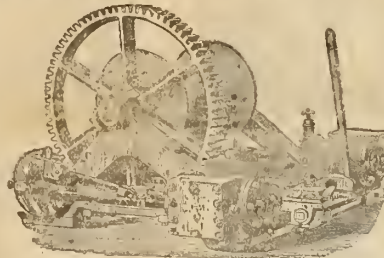
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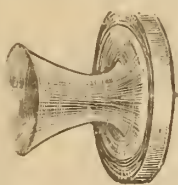
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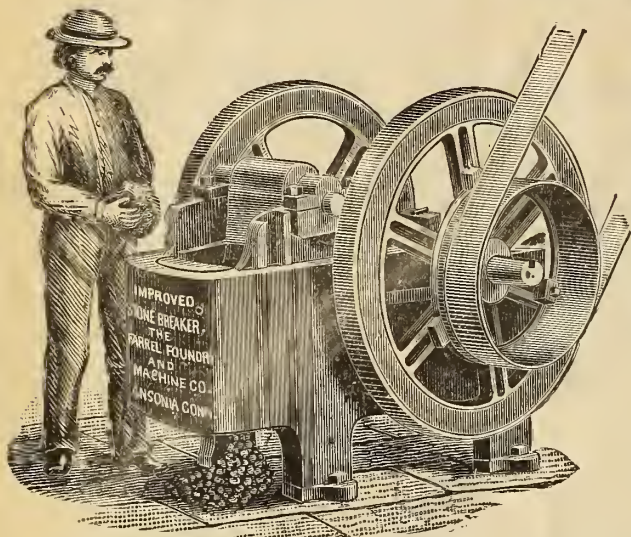
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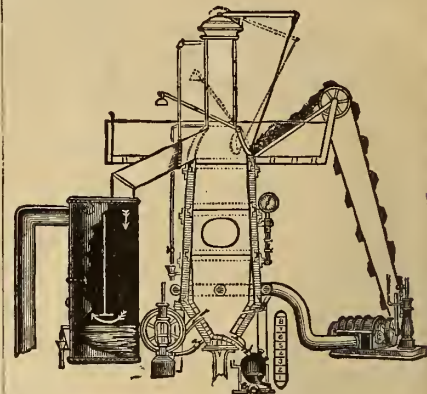
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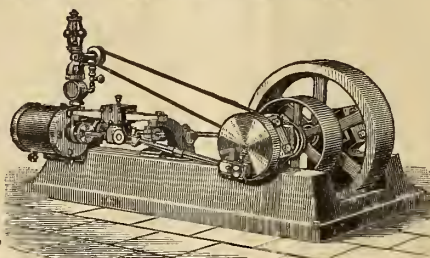
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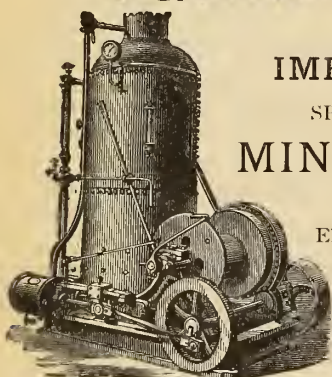
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Notice to Contractors.

SEALED TENDERS addressed to the undersigned and endorsed "Tender for Midland Harbor Works," will be received until Tuesday, the 25th day of January, 1887, inclusively, for the construction of Works at Midland, Simcoe County, Ontario, according to a plan and specification to be seen on application to the Reeve, Midland, at the office of the Resident Engineer, Midland Division of the Grand Trunk Railway, Peterborough, and at the Department of Public Works, Ottawa, where printed forms of tender can be obtained.

Persons desirous of tendering are requested to make personal enquiry relative to the work to be done, and to examine the locality themselves, and are notified that tenders will not be considered unless made on the printed forms supplied, the blanks properly filled in, and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque made payable to the order of the Honorable the Minister of Public Works, for the sum of one thousand dollars (\$1,000), which will be forfeited if the party decline to enter into a contract when called upon to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,

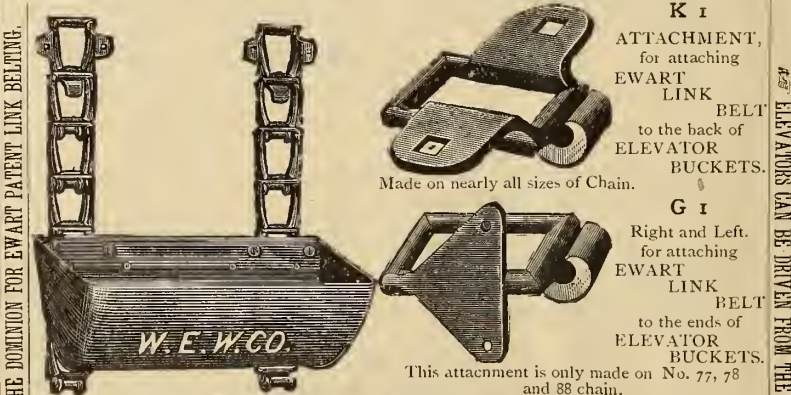
A. GOBEIL

Secretary.

Department of Public Works,
Ottawa, 24th December 1886.

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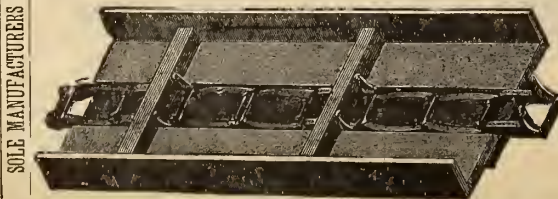
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SEALED TENDERS addressed to the undersigned and endorsed "Tender for Hot-water Heating Apparatus, Post Office Building, Hull, P. Q.," will be received at this office until WEDNESDAY, 19th Jan., for the erection and completion of a

Hot-water Heating Apparatus,

— AT THE —

Post Office, &c., Building, Hull, P. Q.

Plans and specifications can be seen at the Department of Public Works, Ottawa, on and after SATURDAY, 8th inst.

Persons tendering are notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures. Each tender must be accompanied by an accepted bank cheque made payable to the order of the Honorable the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party decline to enter into a contract when called upon to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,

A. GOBEIL,

Secretary.

Department of Public Works,
Ottawa, 3rd January, 1887.

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OTTAWA.

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The CANADIAN MINING REVIEW is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts as well as others interested in Canadian Mineral Lands are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 20th of the month.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

TO SUBSCRIBERS.

Through an unfortunate and unforeseen accident the printing of the January issue of the REVIEW was so delayed as to entail the publication of a double number absolutely necessary. The present issue has therefore been increased to sixteen pages.

The Development of the Mines of the Ottawa Region.

(By James Stewart, Ottawa.)

Written for the Canadian Mining Review.

The mineral district of which Ottawa is the centre is a large one, including the western part of Quebec Province and the eastern part of the Province of Ontario, and it is to this section especially that reference is made, although the following remarks apply to the whole of the provinces mentioned, the one under Grit, and the other under Tory rule, and as regards the best interests of the miner, prospector or explorer, the saying, "good and bad everywhere," may be put "bad and worse," applies equally to them both.

The development of the mines has an important connection, with the most complete knowledge of the minerals of scientific interest only; and for this reason, and that of the injustice done to one section of the population, by those in power, is the apology offered for these remarks, which may appear to some to have too much of a technical bearing.

About two years ago, when some of these notes were made, there appeared in the news-

papers of almost all parts of Canada articles and correspondence under sundry headings, showing clearly that there is something materially wrong with the mining interest of these provinces as at present situated, that is, an individual ownership instead of Government holding the minerals for rental, or on lease.

Some writers attribute the lack of mineral development and stagnation of the whole industry (coal mining excepted) to the absence of a Bureau of Mining Statistics, or a neglect on the part of the Geological Survey of Canada in not publishing reports of the extent of mining done each year. In making this discovery they at once saddle the Geological Survey with the total neglect of the mining interests, and find relief in considering it the "Scape Goat" in this case, and none tried to arrive at a clear understanding of the position in which the mining interests of the provinces stand at the present time. Had statistics been collected by the Survey they would tend to make more glaring the error in our laws as regards mining lands; the number and acreage of our mining land monopolies, and show more clearly the error our Provincial Legislators have fallen into in selling the minerals with the surface soil to the farmers; it is desired to point this out as the true cause of the lack of mineral development in this district and suggest a remedy.

Others gave the cause as depending on a foreign market for our ores, and extravagance and bad management, with an ill advised expenditure on the surface, of too much money before the mine was developed in depth, and some to untrue and glowing promises, of "millions of tons of ore in sight" on the part of promoters of a new enterprise. There is no doubt, in some cases, these causes have helped to close the enterprise and deter others from embarking in a similar mine or property.

In Nova Scotia, Newfoundland and British Columbia, the Crown or Provincial Government owns the minerals, and issue licences to parties desiring to open and work mines, and in these Provinces, is the business of mining largely and most successfully carried on. While in Quebec and Ontario the minerals are at present sold along with the soil, and in doing so, the birth right and portion of the explorer, prospector, or miner, is given to the farmer, or still worse to the speculator in mining lands, and these sons of toil, have to beg for terms from the miserly farmer, or independent and extortionate land owner or speculator. Mining lands have been sold in this way, during the last 40 or 50 years in Quebec and Ontario; some few it is true are being worked, but the great majority of the most valuable mining lands and mines are in the hands of speculators, or parties who will not work them, and ask for the mines and properties an exorbitant price should an intending purchaser approach them.

This state of affairs, or the act of the Local Legislators selling the minerals, instead of giving a lease or licence, compelling the owner to work

the mine or quarry or it would revert to the Government, or by exacting a low rent or royalty under such a lease or licence, from the profits derived from working the mine, is the cause of so many valuable properties being locked up, as it were, and development retarded, and the mining industry does not receive the attention it would, if these mining lands remained in the hands of the Government. In proof of this may be mentioned the vast amount of mineral land held by companies and speculators in the Lake district, also in Eastern Ontario, and amounting in many cases to thousands of acres in a block, thereby binding the settlement of the country. In Eastern Ontario, alone the amount thus held amounts to many millions of acres of the best mineral lands. The same is true also as regards the Phosphate region in Quebec. It is this system of unconditional sale of mining lands for speculation, without regard to yearly working, that has ruined the mining interests of this district. The error of anyone party owning a large extent of mining land in a block, arises from the fact, which is well known to experienced miners and explorers, that minerals do not occur by chance (but this subject is too large to be considered at present), that is, certain rocks hold certain minerals, and by selling, say to an Iron Mining Company, a few thousand acres in a block, they got other minerals, which they cannot treat or the use of which they may not know, and the ores other than iron remain unworked.

Compare the system adopted in the Western United States, where a mining claim is given to the discoverer on condition that it is worked, or labor spent on it to the extent of \$100 each year, or it will revert to the Government. Under that system the right of discovery of the explorer, prospector, or miner, is respected, and a reward granted him (he can locate two claims), but in Ontario and Quebec, he has no rights, and he is, therefore, drawn to the more inviting fields of the United States. The location of the claim in the States is made by the discoverer on the ground, and placed on record in the Land office, but in this district it is made by a clerk in the Land Office, and not by the discoverer, a practice which has proved fruitful of the worst abuses and frauds on Canadian discovery. In the United States, in granting mining claims in that way, ore accumulated through the compulsory clause to work it, at least so much each and every year, and from its accumulation arose the necessity for milling or smelting works to work it up, and had the same inducements and compulsion been in force in Canada, our mines would have been counted by the thousand, instead of the few now in operation.

The chief ores of this region are: iron, (hematites and magnetic), phosphate, or apatite, and a large variety of pyrites, or sulphuret ores of the miners, holding in places copper, gold and silver in workable quantities, lead or galena, plumbago (black-lead), mica, and others of less importance.

The ores of iron are found in such variety and

abundance that the only reason they are not now worked is the question of cheap fuel for reduction. Next spring certain tests of machinery are to be made, and should they prove as successful as former trials, this question will be settled on a commercial scale, and the smelting of iron established in the district.

The apatite, in the raw state, is largely shipped to Europe, but home demand, or the super-phosphate of lime for fertilizing purposes, can be supplied from the works of the Brockville Chemical and Superphosphate Co. (Limited). The pyrites used by this company for the last few years, for the manufacture of sulphuric acid, has been imported from New York State, but ores from the County of Hastings have been introduced to them, and the supply in future will be procured from local ores. The extended mining of the pyrites ore of the district is a question of much importance to the city of Ottawa with the cheap water power for dressing ores, and grinding apatite, as the sulphur is used for treating the apatite in the form of sulphuric acid, and would form an important industry, if all we exported was shipped as superphosphate of lime, and the residue of the pyrites ore can be most successfully treated after roasting, along with the lead ores, which we also have, and the copper, gold and silver extracted. Our lead ores are too poor in silver (about 5 oz. or \$5 per ton silver) to pay to work for silver and lead alone, but when smelted along with the residue of the sulphur ores, holding copper, gold and silver, the question of working both is settled.

The more extended production of gold also requires attention. No man has ever possessed too much of it, and no country produced too much. Its value increases with the cost of getting it, and the want of it. It is our highest standard of money and exchange, and is therefore the best investment for *surplus* labor and capital, when found in workable quantities. The discovery of gold in California and Australia produced periods of great world wide prosperity. All classes and conditions of men were drawn to a new occupation and country by the high wages earned in the mines. A laborer who had been working for a farmer or tradesman, for \$1.00 or \$1.50 a day, could wash out gold to the value of \$10 or \$20 a day. Can a wise adjustment of our mining laws be made to have this effect, if only on a much smaller scale, by granting free great-mining claims in districts where gold is known to exist?

In iron alone, had such measures been adopted, there would to-day have been enough mined and worked to supply our own wants and for exportation, as is done in Sweden and Norway with similar ores, climate and fuel (wood charcoal), as the laws of that country are such that no mining property may remain idle so long as any one desires to work it. In Sweden and Norway a party owning a mine and not working it, another party can do so by paying the owner half the profit of the working of the mine, and if he gives it up the owner or any other person can under-

take to work it on the same conditions, hence no mining properties remain unworked.

In most European countries, and in some parts of the British Islands, the minerals are owned by the Crown, and at one time, even in Ontario, certain reserves of minerals were made in old deeds, but of recent years this is not the case.

Some may say, in advocating the State owning the land, you are advocating communistic doctrines, but that is another question altogether; what is desired is the State to own the minerals, and is British law and custom, and that is advocated "by George."

There are at the present time thousands of British and Canadian subjects in the United States mining regions who would take up claims in Canada were the laws such as would induce them to do so, but at the present time there is no free grant mining claims given, or compulsion to work on owners, and no inducement offered to explorers, prospectors or miners, to locate and develop a claim, unless stealing one's discovery is considered such by those in power, and that act is best described in the words of Shakespeare:

"You take my life,
"When you do take the means whereby I live."

Under the present system 100 acres realizes to the government, say at \$1.00 per acre, \$100; and in 10 years the country gets the benefit of the amount expended on that mine, in labor, &c., if it is developed and worked, but if not, nothing. While under the system where the government holds the minerals, and gives free grants to Miners, or on lease, or royalty, the country receives at least \$100 per year, for the 10 years say \$1,000, less the value of the 100 acres—\$100, leaving a balance of \$900 in favor of the free grant or lease systems.

The country receives from sale at a two years' purchase:			
Dr.			Cr.
To 100 acres @		By Cash	\$100 00
\$1	\$100 00	No work in 10	
		years	000 00
	\$100 00		\$100 00

The country receives from free grant, at a ten years' term:			
Dr.			Cr.
100 acres @ \$1.	\$100 00	By 10 years	
Actual benefit received by the country in favor of free grant	900 00	work @ \$100	\$1,000 00
	\$1,000 00		\$1,000 00

And under the lease or royalty system, in 10 years the country receives the same as under free grant, together with the additional royalty received when the mine is paying, which may be several thousands of dollars yearly, and increased value of public lands.

But it may be asked, from what source will the government receive revenue, for inspection and office expenses, if they do not sell the lands as at present?

The free grants which proved paying mines, on arriving at that stage, a low royalty is charged on profit, after working expenses are paid, would yield annually a large revenue to the government, than the present system of selling lots.

In proof of this, the British Crown paid the Earl of Derby £50,000 stg. for the Isle of Man, and has been refunded from royalty on mines and quarries, more than the sum paid for the island.

This compulsory working to hold a claim may be considered a small thing in an individual case, as regards the amount of labor employed, but take the returns for a province, or the whole Dominion, and it would amount to a large sum, on all the now known valuable mineral lots throughout Canada.

In thus yearly doing a little on a mining property to hold it, new discoveries would be made, and new life given to what was possibly considered a doubtful prospect. It was in that manner that John W. McKay and other United States millionaires gained their first start; through being compelled to work their claims they made a discovery, which enabled them to sell or work it with profit. The mining interests in Canada will never prosper till similar measures are adopted.

The custom of granting land to farmers under the free grant system, and not giving an explorer, prospector, or miner a free grant, under conditions similar to that of the farmer, or compulsory development of the minerals contained in the property, is an injustice to the mining section of the population, and for that reason settlement has made progress and mining has not.

Some parties argue "but why give away a valuable mine as a free grant?" Ans.—A mining property in this section has no more value than the same amount of land, say \$1.00 an acre, which you now give to the farmer. The miner would return \$100 in labor each year, and develop the mine and prove its value, and if it proved such the Government would receive a revenue from royalty as long as it paid expenses. And some say: "What use would a free grant be to a miner who had not money enough to purchase it at \$1.00 per acre?" Under the free grant plan both the farmer and the miner have energy and skill to develop the value of their claims, with proper provisions imposing on them a certain amount of work yearly, and that is worth more to the country than so many dollars paid into the land office, and the property lie in a state of nature and undeveloped.

There is a wrong system practised in Ontario and Quebec, in selling mining lands by auction. When a valuable ore has been discovered in a section of country the excitement gets strong, and the land office is flooded with applications for lots, and to satisfy, not the discoverer, but contending parties, the properties are advertised and sold by auction, and the competition raises the price beyond that which a miner can afford to pay (the discoverer is not rewarded), and the property falls into the hands of a more wealthy man; but a speculator, who will not work it himself, but purchases it on a speculation of a rise in value, which fails to come, and the properties so sold remain undeveloped. The district ought to be opened as a free grant mining camp, and the properties would be developed under proper

mining laws and inspection, and the country receive many times more benefit than by selling it unconditionally.

A certain Ontario newspaper for the last few years has sent round a reporter to the various mining settlements, whose principal business is to write a description of the mines visited, but more after the style of an election dodge, or blind, to show the splendid development under the present system of management of the Ontario Land Office, but failed to see, even through "spectacles," the much needed "reform" of the mining laws and "reformation of the land office and the number of Grit mining land monopolies in Ontario. If the location of a claim was made by the discoverer *on the ground* (as is done in the Western States), he would not be at the mercy of interested parties, who manipulate the land office for their own purpose.

The vast importance to a country of the proper development of its mineral wealth, renders this subject one requiring the attention and careful consideration of our legislators and citizens.

Precise Geological Position of Siphonotreta Scotica.

NOTES ON AND THE PRECISE GEOLOGICAL HORIZON OF SIPHONOTRETA SCOTICA (DAV.)

Written by Henry M. Ami of the Field Naturalists' Club.

At the Montreal meeting of the A. A. A. Sc. in 1883, Mr. J. F. Whiteaves, of the Geological Survey office, read a communication or paper in which there was then recorded for the first time the occurrence of a beautifully fringed or spinose shell which Dr. Thomas Davidson had recognised as the Scottish species, to which he had given the designation *Siphonotreta Scotica*. The specimens referred to in that paper had been collected by Mr. Watts, of our club, who handed them over to Mr. Whiteaves for determination, and through the generosity of Mr. Watts, the specimens in question have been presented to the National Museum, and may now be seen in the cases of the Geological Museum at any time.

These specimens had been obtained from blocks of impure limestone about Mr. Watts' residence near Cummings' bridge, and were said to have come from a well which was sunk on the same property. There was but little doubt from the lithological aspect of the rock, as well as from the few associated species then obtained likewise, that the species was referable to the Utica formation. That such was the case will be clearly seen from recent investigations made with that object in view. As has already been noted on previous occasions, the upper members of the Trenton formation consist in impure argillaceous or clayey limestones, inter-stratified with more or less thin bands of shales, whilst the lowest beds of the overlying Utica formation are themselves not only characterized by shales, as most of the formation is in general, but contain also bands of impure limestone. These bands of impure limestone of the Utica—the lower measures of that formation—are well exposed on either side of the Rideau River, in the vicinity of the Rifle Range, and it is in one of these bands that the beautiful little brachiopod in question is to be found. The precise one in which it occurs in tolerable abundance is in that band which, crossing the river from side to side of the rapids, in line with the targets of the

ranges, gives the peculiar orographic aspect to that portion of the river, and form the head of the rapids or little fall, above which, and as far as Hurdman's Bridge, the river flows quite smoothly. From this easily recognised and accessible band, a number of other members of the club have, besides the writer, had the pleasure of finding several specimens or individuals of this species. As far as we are aware this is the first time that this species has been recorded to have been found *in situ* in this country, and it may be found at any time by any member of the club. There are numerous points as yet to be investigated with regard to the affinities of this species; even its generic relations are not all exactly defined, and there is wanting evidence wherewith to describe its internal structure.

Dr. Davidson and Dr. Schmidt agree that the genus is allied to a *Lingula* and belongs to Prof. King's sub-division *Tretenterata*. The mode of preservation of the Canadian specimens, its phosphatic (?) character show its affinities to be as above. In examining the zone of this species, the following notes were obtained on the stratigraphy of the rocks at that place.

The following is a section obtained on the spot and given in ascending order:—

1. Lower bed of section, which is, no doubt, close to the line of contact between the Trenton and Utica formations, is an irregular, uneven bed of impure nodular limestone somewhat bituminous and holds fragments of *Orthoceras*. This is followed by another similar band of impure limestone which, in its turn, is overlaid by dark brownish black bituminous and very brittle, shaly beds.

Two bands of limestone interstratified with friable shales then occur, upon which rest bituminous and impure shales, holding *Asaphus Canadensis* and other fossils over which the *Siphonotreta* band occurs.

This band marks a special zone in this formation, and from it no less than sixteen species of fossils have already been obtained, and more will no doubt be obtained after further detailed examination is carried on. The following is the list of species:—

Lingula curta—Hall.
Lingula elongata—Hall.
Lingula quadrata—Eichwald.
Siphonotreta Scotica—Davidson.
Orthio testudinaria—Dalman.
Strophomena alternata—Conrad.
Leptæna sericea—Sowerby.
Zygospira Headi—Billings. (*typical*).
Zygospira modesta—Say.
Zygospira (*probably new variety*).
Conularia Trentonensis—Hall.
Asaphus Canadensis—Chapman.
Asaphus megistos (Locke), or *platycephalus* (Stokes).
Calymene senaria—Conrad.
Beyrichia oculifera—Hall.
Leperditia cylindrica—Hall.

From these it would then follow that the age of the rocks in question is as near as it can be laid down at the base of the Utica formation not far from the top of the Trenton formation.

On a single specimen of shale there occur the following species:—

Siphonotreta Scotica—Davidson.
Leptæna sericea—Sowerby.
Zygospira Headi—Billings.
Asaphus Canadensis—Chapman.

This association is a very interesting one and worthy to be put on record. Numerous crinoidal fragments also occur with the above species, and in the *debris* of the shales the typical *Triathrus Becki* was found to occur there, and it is not inserted in the list as it was not found *in situ*.

Every species mentioned in the above list was carefully collected in the same band in which the *Siphonotreta* occurs, so that its exact stratigraphical and palæontological relations are now pretty well known. There remains, however, much to be done in ascertaining the internal character of this species, which, in Scotland, characterises the Llandeilo formation of rocks of Ayrshire, where it was discovered by Mrs. R. Gray at Craighead.

Should any member of the club find any specimens showing either muscular or vascular impressions in the interior of the shell, or other internal characters, it would be conferring a benefit to science to contribute the same in the club's transactions or some similar medium of publication.

Some Economies in Iron Manufacture.

By Alex. E. Tucker, F.C.S.

I have been led to choose this subject for the paper which I have the pleasure of reading to-night for more than one reason, for it seemed to me there are continuing defects in ordinary puddling which may be lessened if they cannot be altogether prevented. I am aware that several excellent papers have been read before this institute on matters more or less connected with puddling, and I therefore hesitated in bringing the subject again before you. Since, however, those papers were read the development of the process known as the Basic-Bessemer and Basic-Siemens processes for the manufacture of steel, with which for some time I have been associated, has thrown considerable light on the practical chemistry of puddling, and although it would be entirely out of place for me to enter into any one of the questions raised as to the exact chemistry of any of these manufactures, yet an attempt at a general application to the subject of puddling of what we now know respecting soft steel making, seemed to me eminently suited to the circumstances in which puddling is at present placed.

I propose to borrow some facts which chemistry has brought out in the development of steel making, and to try to apply them to iron making.

If my judgments in the matter are not in agreement with the more extended practical experience of those gentlemen immediately concerned, I trust our evening will not have been unprofitably spent in discussing the points which I shall raise.

I shall in the foregoing remarks, speak at some length of the relations which chemistry has developed in respect to iron and steel making, and I may premise that it seems to me somewhat remarkable that scientific treatment has so seldom been observed in the art of puddling, because the reactions of puddling are entirely chemical, and although we must confess to ignorance on many of its problems, yet we have a general grasp of the whole subject, and the chemistry which has ensured economies and successes in the spring time, as it were, of steel making has been available in the autumn of iron manufacture.

In treating the subject from this point of view, I am most anxious to avoid any unnecessary chemistry. I feel it would be entirely out of place, and I hope that the wish of your secretary, who enjoined me to treat the matter as practically as I could, may be fulfilled.

I do not wish to suggest that analyses of the materials used and of the products obtained would ever have done for puddled iron what it has done for steel: that is impossible. We must bow to the magnificence of those developments

which have culminated in the possibility of producing 500 tons of steel from two Bessemer converters in 12 hours, but I do not hesitate to say that economies may be effected by knowing more exactly the composition of materials operated on, and the physical and chemical conditions under which the impurities of the pig may best be removed, and it is with such economies that I propose to deal.

The practical process of puddling from a chemical point of view is extremely simple, and consist, as is well-known, in the absorption of silicon, sulphur, phosphorous and manganese contained in the pig iron by the oxide of iron used in the fettling, and in the removal of the carbon by its reduction of the fettling to matallic iron. We have, therefore, a debit and credit account—there is a loss in weight due to the removal of the bodies I have named, and there is a gain in weight due to the production of metallic iron from the fettling. The same removals take place in the basic process, but there is no gain in weight from reduction of oxide of iron, as instead of oxide of iron being used for the lining or fettling of steel making apparatus it is found better principally on account of the great heat developed, to substitute a variety of lime. This point of departure leads to an important matter in economy, of which I shall presently speak at more length. In addition to these differences in the two apparatus, there is the important one that while in the puddling process the whole of silicon, phosphorus, sulphur, carbon and manganese are burnt by the oxide of iron, in the case of steel they are mostly burnt by the air blown through the liquid metal.

Now, leaving these well-known facts it will, on a moment's consideration, be obvious that there must be a certain percentage of these bodies silicon, phosphorus, sulphur and manganese which is best adapted for the particular process concerned. In the case of steel this percentage is that which is just enough to produce the requisite amount of heat to keep the bath of metal sufficiently fluid—you will recollect that there is no fuel used beyond that in the metal itself—any excess of this percentage of course means waste, and any deficiency means waste on account of cold and, therefore, skulls, etc.

It will, therefore, be profitable to consider in what way any excess or deficiency of the elements named affect the quantity and quality of the resulting iron, I will just glance at all of them, but it will be well to bear in mind that it is the percentage of silicon and phosphorus which practically decide the merits of forge pig. Take a single case, and let us suppose that the best possible result in puddling in a given furnace is obtained with an iron or mixture of irons giving a percentage composition of:

	Per cent.
Silicon	1.50
Phosphorus	1.00
Sulphur	0.09
Carbon	3.50
Manganese	0.50

and we substitute a mixture containing 2.50 per cent. of silicon, the other elements remaining the same, what do we know will be the result? In the first place we know obviously that one per cent. of the material which cost pig price will be wasted; we know, also, that one part of silicon requires about four parts of iron to slag it off; we therefore have a total loss of five per cent. of iron. This means a waste of about a ton of iron per week per furnace, which must be valued at puddled bar price. The matter does not however, end here, we now know enough of the chemistry of dephosphorizing to say that the complete removal of the silicon is effected, hence

if the puddler does not work at his heat and get this silicon into the condition of slag, before balling-up, it follows that the bar will be crystalline and break short—it will contain too much phosphorous.

This prior removal of silicon before that of phosphorous is well shown in the diagrams before you, they have been worked out from very numerous analyses of samples taken at various stages of the two processes named. I am indebted to my friend Mr. F. Harbord for the loan of that one showing the Basic-Siemens actions. I hope they show in as clear a manner as is possible the point I wish to indicate. I am aware how difficult it is for one unaccustomed to chemical language and figures to fully appreciate the significance of facts stated in chemical language alone, and so I have brought before you some pictures which show the actual progress of the removal of the various constituents.

You will see from them that the waste of iron stated above becomes a necessity unless an inferior bar can be tolerated. Thus in the diagram of the puddling process, you will see that at the expiration of half the time required for the process 98 per cent. of silicon is removed, while only 60 per cent. of phosphorous has gone. So it follows that if we started with the standard charge named, we should at this particular point,

$$\begin{aligned} & \text{have a metal containing } \frac{1.50 \times 98}{150} = 1.47 \text{ and} \\ & 1.50 - 1.47 = 0.03 \text{ silicon, but } \frac{1.00 \times 60}{100} = \\ & 0.60, \text{ and } 1.30 - 0.60 = 0.70 \text{ per cent. of phosphorus.} \end{aligned}$$

I may here state that such a result would give a splendid bar when the operation was finished, inasmuch as much finished iron contains this percentage of phosphorus, and indicating, therefore, that a much more impure charge has been used than that which is under our notice.

If we now take the case of our inferior charge containing 2.50 of silicon it will be clear that, under the same conditions as regards heat, fettling, etc., the metal at the same stage of the process will contain a very considerable percentage of silicon, probably, I should say, half a per cent., so that we may be sure it will also contain a very considerable percentage of phosphorus. We therefore are conscious of both waste and bad quality of product.

From these considerations you will see how the matter works out in actual practice, and how great the tendency is to steer a middle course, avoiding on the one hand a waste of metal, and on the other a highly phosphoric or hard iron. With a pig ill fitted for the best economy it is not to be expected that any assistance can come from the puddler himself, it being against his own interest. He is bound to make a compromise, and by increasing his yield he must keep the ball impure.

Leaving now the subject of silicon, we come more immediately to the element phosphorus. What do we learn about this in addition to what has preceded. Supposing in our normal charge we have 2.00 per cent. of phosphorus instead of our 1.00 per cent., what is the result? We gather from the examination of practical results in puddling and the basic process, that at least five parts of iron are required to absorb one part of phosphorus, so that we had a loss of some six per cent. of metal, which must be also valued at at least puddled bar, inasmuch as the same, in fact more, work and material is required for its removal, as if it had been absent, so that this element of eliminated is still more wasteful than silicon.

Sulphur does not call for extended remarks, because, although puddlers handle the name pretty glibly, they almost invariably have the wrong bull by the horns, inasmuch as sulphur is not often present in injurious quantity when the pig is a fairly grey forge, and although a high percentage of course occasions waste, I am afraid I have already dwelt too long on other matters to allow of our discussing a much less-important element.

The relations of copper and sulphur, however, are of interest in conjunction with the use of purple ore in the manufacture of iron. I am aware that there is a considerable prejudice against the use of this material. I have, however, been associated with its extensive use, both as an ore and as a fettling, and my experience is that the copper and sulphur which it contains in considerable quantity, are injurious only when they appear together in the pig or finished iron. I have seen large quantities of excellent finished iron made from a pig containing a quarter per cent. of copper, as soon, however, as any attempt was made to use commoner or sulphury pig in admixture with the coppery pig, the results were disastrous. I have found also that if there is a tendency to red-shortness in the bar, it may be removed by mixing the purple ore with some five per cent. of very fine lime, no injurious effect need be anticipated from the lime, if fine enough, and it will absorb the sulphur. This latter may certainly be set free by the silicon of the pig, but it does not enter the iron, and probably passes up the stack.

Carbon, inasmuch as it does not waste metal, but, as I have said, increases the yield, calls for no special remark. I may, however, repeat that the more the pig contains the less sulphur and generally the less manganese is present.

MANGANESE.—I must claim much partially for this element. I believe it is the key to much economy in puddling. I think there is *prima facie* evidence that it is as important in the puddling furnace as it is in a Bessemer converter, notwithstanding the fact that the finest finished iron will sometime contain only traces of it. It will, however, be found that all the best irons, without exception, are made from pig containing considerable quantities of manganese, and, indeed, in the old days, when all-mine pig—which meant manganiferous pig—was the rule, bad iron was the exception. "Iron was iron" in those cherished days; but with respect to the pig used, it would have been difficult for an ordinary puddler to make a bad bar from it. There are several reasons for this: In consequence of a manganiferous pig containing less sulphur, less work would be thrown on the fettling. The phosphorus therefore, from this cause alone, would be more completely removed. Manganese, again, makes a thin fluid slag, the ball is therefore more thoroughly washed. Again, the oxidation of the impurities of the charge may be pushed much farther than when a pig is free from manganese. This point I well seen in the basic process. In the absence of manganese in the pig the bath of metal is unduly burnt or oxidized, and the resulting steel is redshot. Such redshortness is always avoided by taking care to have plenty of this element in the pig, indeed I have myself made several blows of excellent steel by using such a pig without any of the usual additions of ferro-manganese, and I have made many hundreds of tons of steel of equally high quality in which the additions of ferro was so small that the putting of it in at all might be regarded more as a matter of form than one of actual utility.

This matter also works out practically in puddling, and in addition to what I have said above

all-mine pig, the beneficial effect of manganese has long been recognized in Germany, and there is no doubt that its presence admits of a much more perfect removal of phosphorus. An explanation in addition to that respecting the increased fluidity of the slag may be found in the fact of the strong affinity of manganese and silicon for one another, and we have seen that it is just this silicon which is so desirable to remove.

One more instance of the probable effect of manganese may be noticed. It has been found possible to puddle hematite iron with fettling obtained from ordinary puddling, but when the fettling was itself obtained from hematite pig, the iron produced was redshort. I am inclined to think that the reason of this is that the manganese in the fettling from the phosphoric pig is possibly reduced along with some iron, by the carbon of the hematite pig. The metallic manganese then entered the puddled ball and reduced the liability of it being subsequently burnt. I give this explanation without having any evidence to support it from the facts themselves, but there is no question of the results.

Although alloys of manganese and iron are known, their formation in the puddling furnace is impossible, and there being only the silicon to alloy with the manganese, it follows that beyond the actual loss in weight due to the percentage of manganese, there is no loss in the iron due to its presence.

In this beneficial action of manganese we have the explanation of that observation that the highest class of pigs frequently yield poorer than a medium class—we get a purer iron; it will therefore weigh less. The amount of slag, again, would frequently be small; the heat would, therefore be dry, and some iron would be carried away mechanically.

The economical way of dealing with this dry condition of the heat, which, however, is not I think a frequently occurring difficulty, will be obvious from what has been said about silicon, and it is found advantageous to scatter a few handfuls of sand on the iron just before balling up. The effect of course being to make a more fusible cinder, which will clear the iron without any appreciably bad effect. Again, the use of cinder pig in the subsequent charge will economically bring down any gathering bottom. It will make a more natural cinder. These matters are, however, well known, and I fear appearing presumptuous in alluding to them. The reverse action, *i.e.*, of remedying a scouring cinder and so increasing the life of the furnace, is not so often practised. Scrap is generally used for the purpose, but the desired result may much more economically be obtained by the use of a sufficient quantity of finely-powdered lime, if it be inconvenient to change the mixtures. It is well to drop the damper when this is put in, to prevent the lime being carried on to the neck and roof of the furnace, and so slagging the brickwork. No bad influence will follow if the lime be fine enough. It will absorb the silicon of the iron, and therefore prevent the combination of the two better. It will hence be more economical to use lime than increase the fettling or scrap.

The time remaining at my disposal will not allow me to more than briefly allude to a few remaining points in economical puddling.

From what I have said about the mutual action of silicon and phosphorus in the puddling furnace, you will see the very great advantage of having such a peculiarly constituted metal as refined iron, and it may be useful to show in a tabulated form what the process of removal of the impurities in the refinery is. I give the results taken from my note-book of successive stages in this refinery process, so that you may

see the very considerable changes which have been effected.

The phosphorus in the puddled bar would be extremely low when such a metal was judiciously used with ordinary pig, hence the high excellence of the bars so obtained.

The following are the figures:—

	Per Cent.			
	Carbon.	Silicon.	Sulphur.	Phos.
Rhymney Forge Pig...	3.52	1.86	0.05	1.72
After melting....	3.42	0.62	0.05	1.65
8 minutes after melting.	3.36	0.52	0.05	1.50
12 " " "	3.32	0.38	0.04	1.46
16 " " "	3.30	0.32	0.04	0.85
22 " " "	3.20	0.23	0.04	0.85
Refined metal.....	3.15	0.20	0.04	0.80

Unfortunately the cost of producing these results is very great, and it seems to be found cheaper to use a more impure pig and do the refining in the puddling furnace itself where, as we have seen, it is done at the expense of the fettling. Now, we know that silicon at least can be removed without any such expense of oxide of iron. The first stage of the acid Bessemer process consists in the removal of silicon, so that by Bessemerising molten pig iron we obtain the desired result.

I have had the pleasure of seeing this done with forge pig in Belgium, where a refinery was attached to the blast furnace and the molten metal run into it. The effect being that some 50 per cent. of silicon and 25 per cent. of phosphorus was removed. I am unacquainted with the reasons which have prevented the more general adoption of this practice. It seems to me to possess very great advantages, and there are works at which it is extremely difficult to obtain silicious pig when using a cinder pig burden.

THE DEVELOPMENT OF MINES.

By C. M. DOBSON, M.E.

For some years the mining resources of Canada have been worked and partially developed by a few enterprising capitalists who have, either from a practical knowledge of the mineral wealth of the country, or from theories of geologists, who in pursuit of their calling have made such discoveries, entered into such speculations that in any other country than Canada would have brought the whole of the capitalists, or their agents, from London to examine and interest themselves in such properties. However, owing to an unexplained laxity on the part of the owners of these properties, the mining interests, and almost inexhaustible mineral wealth, has not been developed in a way calculated to inspire the confidence of capitalists who are comparatively unacquainted with the country and the mineral formations. It is the opinion of several mining authorities that would the promoters of public companies and mines in Canada take more of their speculations into the English market, where Canadian mining stock would acquire a ready sale, sufficient capital could be raised to efficiently develop a property. Whereas at present these great interests are almost confined to Canadian cities and Canadian capital, the result is that a mine is floated with an inadequate capital, development commences, and before any tangible result is obtained the small capital is exhausted and at the vital moment when a result is within the grasp of the speculators they "shut down" and the work that has cost so

much is left to fill up with water and the plant to indicate where another "bubble had burst." The writer could name scores of properties that have gone the same way owing to the improvident and thoughtless way of commencing operations.

Take these valuable concessions to the place where the money is, and where, if it can be proved, as it can be, that there is a chance of realizing a return, they will give all the money that is necessary for the efficient development of a legitimate speculation,

CORRECTION.

In our last issue, through misadventure, it was stated that the Hartford and Capel mines, together with all moveables, had been sold by the Eastern Townships Bank to Messrs. E. H. Nicholson & Co., of New York. The purchasers were Messrs. E. H. Nicholls & Co., and the property belonged not to the Eastern Townships Bank but to Wm. Farwell, Esq., late manager of the bank. The price realised was \$50,000. In another place will be found a list and description of other properties now for sale owned by this gentleman.

Personal.

Mr. C. M. Willmott, of the Geological and Natural History Survey of Canada, has returned from England. He was in charge of the Mineral Court at the recent Indian and Colonial Exhibition.

Mr. C. M. Dobson, C.E., M.E., one of the engineers on the River Niger (West Africa) Survey, 1885, and more recently connected with the Brantford Telegraph, is now resident in Ottawa.

Our Gold Mines.

(From B. C. Colonist.)

QUARTZ MINING.

Now that railway construction within the province has been completed for the present—though it is hoped that many of the numerous projected lines will shortly be commenced—there is time to look after some of the important industries, and to a certain extent this has been done during the past summer. Among what will in the near future prove to be the most important factor in the prosperity of the province is quartz mining, and to this branch during the past year has been paid particular attention. The richness of the ore and the extensive character of the deposits have long been known, but the fiasco upon the first introduction of quartz machinery and the great work later of building the Canadian Pacific through the province served to keep the quartz interests in a dormant condition. However, they are on the eve of a revival and the coming year will see large developments.

Probably the greatest effort being made in the province to work a mine is the work now proceeding on the Foster Milling & Mining Co.'s property, with works at what is known as the Big Slide, some fifteen miles below Clinton. This company have quartz mill and chlorination works in position, have unlimited water power, and, so far as known, a continuous body of rich paying sulphuretic ore. Assays and mill tests go to prove that it will pay richly for its treatment, and a result will soon be known.

The famous ledges of Cariboo in the immediate vicinity of Barkerville are again being developed. The British Columbia Milling & Mining Co., with works at Lowhee creek, have begun to develop their extensive property. This company have already complete buildings, magnificent quartz machinery and engines. Their mine has been prospected sufficiently to show a body of ore eighteen to twenty-five feet in width, and mill tests and assays have proved that it will pay for its being treated. Considerable work is now being done in sinking a working shaft, drifting and cross-cutting.

The Island Mountain Mine, owned principally by Mr. P. Dunlevy, of Soda creek, is also being developed. During the present winter tramways to the mine, tunnelling and drifting and the removal of the mill and other machinery to the site selected, fronting on Jack of Clubs lake, is being carried on, and it is expected that during the coming summer matters will be in a sufficiently advanced shape to begin the work of crushing and reducing the ore.

On the old Steadman ledge, crossing William's creek at Richfield, a small sum will be spent in placing the tunnel in good shape and extending it.

Besides these works, various other ledges of promising character will be more or less developed.

At Hixon creek the already largely prospected mine will be further worked, the mill removed to a more favorable location on the opposite side of the creek and everything got in position for extracting gold.

Along the line of the Canadian Pacific, from Kamloops lake to the boundary line, a great deal of work has been accomplished during the past year in prospecting ledges and placing in machinery to crush or smelt the same. In the Selkirks and Rocky Mountains are wonderful deposits of galena and large deposits of gold bearing rock. North and south of the line of railway, in the Big Bend, along the shores of the Columbia and Kootenay rivers and lakes the capitalist and prospector have visited, and there is every promise that soon the rocky canyons and shores and hills will be compelled to yield up their precious treasures to man.

Coming nearer home, several discoveries have recently been made on Vancouver Island, within easy distance of Victoria, of ledges of gold bearing rock, but none of these have been thoroughly tested, though assays and mill tests have proved that there is gold in quantity sufficient to entitle their being milled if the ledges prove to be continuous in extent.

There has been considerable enquiry from many portions of the Dominion, United States and England as to the minerals of this Province, and many assurances have been given by men of capital that they will invest money in the development of the quartz mining industry. Taken altogether the work accomplished toward creating an activity in quartz mining in the past year must be regarded as satisfactory, and it is not too much to hope that 1887 will witness a progress and prosperity in this individual industry that will be of the greatest benefit.

PLACER MINING.

The past year has not been productive of results as good as in the early part there was reason to believe it would bring. In Cariboo district, owing to the very dry season, work had to be shut down on various of the hydraulic claims, there not being sufficient water to work them. The output for the year is somewhere less than that of any other during its history as a mining field, solely on account of a lack of

water. However, a few new discoveries were made, and it is thought that the coming year will again place the gravel mining industry in a prosperous condition.

Granite creek, in the Similkameen district from which such good results were anticipated has not come up to expectations. Though a few claims on the creek have paid well, a great number of miners who went in have returned without securing any pay, and the several other creeks in the neighborhood have also failed to produce gold in paying quantities.

In the Big Bend country a considerable number of men have been at work during the entire year. On Carne's creek moderately good returns were secured. On McCulloch and French creeks, where deep mining and hydraulic mining are being carried on, some rich gold has been secured, but work has not advanced sufficiently to permit of a correct estimate being formed as to the continuous richness of the district. However, those who are engaged in mining work on the various creeks have every faith that Big Bend next year will show good results. The cost of packing in supplies has seriously operated against the success of the camp.

Cassiar has somewhat improved in the past year, better returns having been secured from the old ground and a new field having been discovered which gave large returns for the limited amount of work done. There will likely be an increase in the number of miners who will go into that district this coming season.

Lorne creek has proved a failure, little return being secured, for the large amount of work done. For the greatest part of the year high water interfered with mining and those engaged have either lost money or scarcely made wages.

One of the best fields during the past year has been that of the Stewart river, a large tributary of the Yukon. This is in the northernmost part of the British possessions, and all those who mined there during the past season have made money—some \$600, others \$6,000. There will undoubtedly be a large rush for this field and preparations are now being made to take in adventurous spirits in the early spring before snow and ice disappear from the rivers and lakes.

Kootenay district will return about the same yield as the previous year. Considerable prospecting has been carried on but no new gold bearing creeks have been discovered. Extensive preparations are being made for hydraulicing next season on a large scale, notably on Findlay creek. The near presence of the railway and the probable construction of a feeder south from the C. P. R., will likely induce a large development of the latent resources of the district during the coming year.

In many other portions of the Province, especially in Yale and Lillooet districts, gold bearing creeks have been discovered and worked with moderate results being achieved. On Vancouver Island a large number of Chinese are engaged in mining. This is especially the case on Bear river in Alberni district, where it would appear that they have made a rich strike from the number who have proceeded to that point.

Taken altogether the past season's work has been moderately satisfactory, and there is every reason to believe that the year 1887 will be productive of largely increased results from placer mining. Supplies are cheapening, shorter, easier, quicker and less expensive routes to the mining fields are being provided, and many fields that previously would not pay to work on account of the high price of provisions and other necessities, will be called upon to furnish their quota to the general prosperity of the gold mining industry.

DUST IN COAL MINES.

VALUABLE PAPER READ BY MR. M. MERCER, WIGAN; BEFORE THE MANCHESTER GEOLOGICAL SOCIETY.

It may be taken for granted that all or nearly all colliery managers and mining authorities are now agreed that coal dust does, and has in the past played an important part in augmenting the intensity and disastrous effects of many of the explosions in mines; whilst a great many authorities are of the opinion that coal dust can by itself under certain favorable conditions cause an explosion similar or even more severe in character and effect, to that caused by fire-damp alone—a proof of which may be cited in the late sad calamity at the Altofts colliery. Evidence at the former is amply furnished by the explosion at Seaham, Dinas, Trimden Grange, &c. To go into the proof of the theories is unnecessary, as it is dealt with extensively in the report of the Royal Commission on Accidents in Mines, and also very fully and concisely in the valuable work on "Explosions in Coal Mines," lately added to the literature of the mining world by Messrs. W. N. and J. B. Atkinson, Her Majesty's Inspectors of Mines, and which should be read by all who are interested in so important a subject. Now, in the first place must be considered the causes responsible for the large amount of this dangerous matter in most dry mines, which will probably be accounted for severally or collectively by the following: 1. The working and getting of the coal at the face. 2. Decrepitation of the pillars and coal scattered in the roadways. 3. Leakage from tube and boxes. The remedies for these evils may be found in the following: 1st. Mode of working, in which there is not much room for improvement: the long wall system being considered much superior to pillar and stall, as it does not leave any pillars to crush and decrepitate, which when being removed produce a large amount of fine dust. 2nd. In the mode of haulage and form of tubs there is probably the most room for improvement, as the systems in use in many collieries are very prolific in the generation of fine dust. The worst of which seems (a) the use of boxes made of green timber which, after a few weeks use in a dry mine, shrink and leave a wide space between the boards, through which the dust is continually falling; (b) the form of boxes in use in some of the South Wales collieries, which have the sides constructed of a lattice work of iron. The remedy for these are—(a). The use of dried and well seasoned timber in the construction of wooden boxes, which should in all cases have grooved or covered joints. (b) The use of sheet iron boxes, fitted with wooden or indiarubber buffers to reduce the shock caused by the boxes jamming against each other. (c) The systems of haulage at high speed are probably the greatest producers of dust, and wherever possible should be superseded by some form of haulage that can be carried out at speeds of two to three miles an hour, such as endless rope or chain with a double line of rails. After having as far as possible remedied the causes of dust generation (which remedies can be only partially successful), there must next be considered the means available for dealing with dust in mines. The first consideration must be its removal from the workings; and the next how to render its properties of danger harmless. With reference to the former: The removal of the dust entirely is not practicable for to be done properly would require an army of scavengers being kept constantly at work, and even then the finest and most dangerous particle would still remain; again, unless water is copious

ly applied during its removal large clouds of fine dust will be constantly passing with the currents of air to the danger of the mine, and will be again deposited on the roof, sides, and floor of the roadways. With reference to the latter consideration, viz., how to render the dust harmless, there have been several methods proposed. 1. It has been proposed to raise the temperature of the intake air to the natural heat of the mine; it being claimed that all air entering the mine at a low temperature is gradually raised, in doing which most of the moisture is evaporated from the dust. This antidote (which would only prove partially effective) is most impracticable, as it would be very costly to artificially heat the air some 20 to 40 degrees, and as deep mines are at present much too hot for comfortable working, if the temperature of the mine be thus increased, as it would by the suggested method it would probably necessitate the paying of extra wages in the getting of the coal. The heated air would probably affect the roof and sides of the mine, and also decrease the quantity and efficiency of the ventilation, so making the "cure worse than the disease." 2. Strewing the work with common salt or brine has been proposed, and is used to some extent to keep the dust in a moist condition. It gives good results if used on the following basis:—One pound of salt per square yard of area, applied once a week for the first month, and once a month afterwards. Its use has the following disadvantages:—Salt is expensive, costing about 9s. per ton (though if used extensively it could probably be obtained at a cheaper rate). The cost of labour in spreading the salt will be heavy, and additional matter will have to be removed, this again adding to the already heavy cost of working mines. 3. The turning of exhaust steam into the air courses has been proposed, but anyone who has had to do with steam engines in a mine, knows the havoc it works with a roof composed of shale, therefore there is little probability of this method being used to any extent. 4. The best and most practical method is the watering of the roads by (a) water carts, or (b) the laying of pipes in the haulage roads and main air courses; both of these methods have their advantages and disadvantages. These require very careful consideration, as it will be in these directions that the solution of the problem must be expected. (a) The watering of main intakes and returns by water carts, of which there were several varieties, viz., ordinary water carts with holes in the bottom, carts constructed on similar lines to those used in street watering, with a pipe at the back to diffuse the water by its flowing through small apertures in the pipe. A very ingenious cart was constructed by Messrs. Smethurst for use in their mines at the Gatswood Hall Colliery. It consisted of an ordinary water barrel mounted on tram wheels; at one end was fixed a hollow circular rose perforated with small holes around its circumference, and connected by gearing to a toothed wheel on the axle of the tram wheels. The water was delivered into the centre of the rose or disc, which revolving very rapidly when the tub was in motion, scattered the water by centrifugal force against the roof, sides and floor of the roadways. The disadvantages of this system are—1st. The cost of conveying the cart about the mine, which will also interfere with the ordinary coal traffic. 2nd. The cost of keeping a road constantly laid in the return air courses. 3rd. The water falling in one place only when the carts are stationary, will have an injurious effect on the floor in that particular spot. This, however, can be remedied by so arranging the cart that it shall automatically close the outlet when the cart is not in motion. The

second system consists of the laying of water pipes along the sides of the main road and air courses; this appears the most feasible, if properly arranged to conduct water from the surface, or any convenient level in the shaft. The pipes being provided at suitable intervals with collections of small holes or apertures to diffuse the water in the form of five sprays into the road. The distance apart of these sprays would have to be determined by practice, and should hardly need to be less than 10 to 20 yards. This system if properly carried out with a good head of water, possesses the following advantages:—1. Is a very sufficient method, as the water can be turned on when the mine is not working so as to cause no inconvenience to the men employed. 2. Does not require the keeping of a permanent road in the return airways. 3. After the first cost of pipes and fixing would not require any heavy expense to keep in working order. 4. Would prove of great service in case of fire in the mine. 5. Can be connected with the working face and drawing roads by flexible tubing. 6. Will not injure the health of the men as the atmosphere will not be saturated with moisture in suspension during the time the men are at work. 7. Can be so regulated that only the proper amount of water shall fall on the roadways to damp the dust, as with a soft flood the water in excess will cause the warrant to heave. Its disadvantages are:—1. First cost of pipes and fixing, which will be heavy. 2. Danger of the small apertures becoming clogged by dust and dirt. 3. Danger of the pipes being broken by falls of roof and sides, and the lifting of the floor. These can be somewhat guarded against by having the pipes slung from the timbers, and providing expansion joints and stop-cocks, so that the water can be turned off at any particular point or branch during repairs. 4. The necessity of having clean water free from all matter in suspension and accompanied by a good pressure, this again being of itself a counter disadvantage as it necessitates the use of stronger pipes. 5. The necessity of having suitable settling tanks and grids, to prevent any solid matter entering the pipes. In conclusion there are several points to be considered. 1st. Is there any necessity to damp the dust in any other than the main haulage roads and the return airways near to the bottom of the upcast shaft. Messrs. Atkinson have clearly demonstrated that in the explosions of which they treat in the book alluded to, "that the blast did not in any of the instances quoted travel to any extent in the returns." They further draw attention to the established fact "that in all explosions the blast travels against the air towards the downcast shaft," as a confirmation of their theory that "the dust in the return being chiefly composed of shale and metal does not transmit the blast." At the late explosion at the Altofts colliery the same phenomena was observed, and this was also the case at Mardy, &c. 2nd. What will be the effect of damping the floor in mines that are subject to creep? Will the frequent slight waterings of the dust be sufficient to keep it moist without allowing the water to affect the warrant? 3rd. Will the spray at specified distances be effectual in rendering the dust on the sides and timbers harmless? 4th. The advisability of dissolving salt in the water so utilised, and will it be likely to crystallise and stop up the apertures? 5. The advisability of hanging a sheet of brattice cloth, saturated with water, over and in front of all shots fired in the coal or metal, as a preventive to the flame during the dust. 6th. The advisability of reducing the velocity of the air in haulage roads by enlarging their areas, or provided additional roads for the intake air. 7th.

The advisability of adopting the remedy, suggested by Messrs. Atkinson, of separating each district by means of lengths of arching, to be kept quite free from dust by brushing and watering, and to confine an explosion to the one district.

Beauce Gold Mines.

AN INTERESTING DISCOVERY MADE ON THE ST. ONGE PROPERTY—ENCOURAGING INDICATIONS.

The St. Onge Gold Mining Co. have established the fact that there is an ancient river channel running through the company's property at a depth of 165 feet from the surface, from which channel a considerable quantity of fine and coarse gold has been washed. News has just been received by the president of the company that the ground is getting richer as the head of the rapid (on which the shaft was sunk) is reached. In January ten feet of drifting produced nine ounces of gold. One nugget was worth \$23.27, another \$13, and so on. The owners deserve every success for the plucky way in which they have stuck to the development of their property. We hope to be able to give a full report of the workings in our next issue. Already a good deal of excitement has been created by the recent find.

WASTE MICA.

SOME USES TO WHICH IT CAN BE APPLIED.

The best employment of the immense quantities of scraps and fragments of waste mica which suggests itself as worthy of a wider field than it now possesses is the substitution of mica for glass in spectacles worn by workmen, especially stone and metal workers, to protect their eyes from chips and splinters. As already made in Germany, these mica glasses are concaved in the shape of watch glasses, and are about one twenty-fifth of an inch in thickness. The advantages gained by this utilization are greater than would at first be imagined. Mica spectacles cannot be broken. Pounding with a sledge hammer merely flattens them, nor does molten metal poured on the mica affect it. The shower of pointed iron particles which issues from lathes merely rebounds from the elastic mica glasses. Another use for mica is its application, when previously colored or metalized, to ornamental purposes. From its unalterable nature, the material preserves gilding, silvering or coloring from deterioration; and from its diaphaneity, the articles so treated will preserve all their brilliancy. Finely ground mica, or colored gelatin, also shows handsome effects, and when mixed with a solution of gum arabic, it makes a good silver ink. The gelatin combination is used for inlaying buttons. Another beautiful application of mica is in the production of bronze-like colors, which bear the names brocades, crystal colors and mica bronzes. Among the advantages of these are that they are indifferent to sulphurous exhalations, are very light in weight, and in some colors are even more brilliant than the metal bronzes. When small particles of mica silver are spread over articles coated with asphalt varnish, the result is a good imitation of granite. The crystal colors are also suitable for calico printing; and fabrics to which they are applied surpass in brilliancy the heavy bronze and glass dust fancy fabrics of Lyons. Such colors have been used to decorate porcelain and glassware, the articles undergoing a second heating up to the fusing point of their

glazing. By suitable dyes, the material is easily colored to a variety of hues.

Mica has been used on board war vessels, in localities where glass would be broken by the concussion due to the firing of heavy guns. It is also employed for roofing purposes, and in several patented processes forms a water and fireproof covering for strata of rubber, tar, canvas, felt, and similar materials.

Mechanical Ventilation of Mines.

At the present time more than ordinary attention is being directed to the best means of ventilating mines, more particularly those where a large quantity of gas is constantly produced. The atmospheric air sent through a colliery undergoes in its passage certain modifications which renders it unable to keep the workings clear of gas. The respiration of men and animals gives birth to extremely deleterious gases. Sulphides become sulphates, carbonates turn into peroxides, whilst vegetable and other matter undergoes fermentation in which the oxygen disappears and gives way to carbonic acid, carburetted hydrogen, nitrogen and ammonia. For the safe working of our mines it is, therefore, essential that there should be a large and constant supply of fresh air sent from the surface so as to permeate every part of the workings. To effect this, various systems have been in operation, including the furnace, fans, steam jets, screws, etc. The furnace has long been the means of ventilating most of the collieries in every part of the kingdom. The amount of air produced by a well constructed furnace varies from 4,000 to 8,000 or 9,000 cubic feet per minute for each foot in breadth of the bars. Still the temperature of furnaces is very variable, and to some extent also the ventilation, while there is considerable danger in the return air containing the gas being carried over the furnace instead of through a dumb drift into the shaft. The furnace is also a source of danger from other causes. For a few years ago the stack for feeding the furnaces ignited at a large colliery in England, then set fire to the coal, and led to a loss to the proprietors of more than \$300,000, and to the pulling down of a powerful fan.

But mechanical ventilation, it may be said, is by no means a new system, although of late it has made very great progress, for we find the Duck machine was in use at the commencement of the present century in Cornwall, Eng. Mr. Strauvé, of Swansea, made some important improvements with respect to aërometeos. By covering them so as to make them double acting, and placing the valves at the side, he succeeded in producing a machine far superior to any that had preceded it. Of late years however the superiority of the fan has been clearly demonstrated by Mr. Morrison, of Newcastle, the agent of the Guibal, which deservedly takes the highest rank. The Schiele fan, an economical one, taking up comparatively little room, and not requiring either expensive machinery or masonry, has made marked progress of recent years.

Ventilation by means of the steam-jet was revived some years ago, but this system failed.

A new company, under the name of the "Templeton and Blanche River Mining Company," has been formed with a view to carrying on the phosphate industry. The capital stock is \$33,000, divided into shares of \$100 each. Messrs. H. Beaugrand, W. Cassils, L. Sutherland, S. C. Stevenson, P. S. Ross, H. Graham, H. S. Reddy, D. Anderson, J. Beattie, A. Rudolph and A. M. Perkins, of Montreal, are prominent leaders in the enterprise.

PHOSPHATE.

LATEST QUOTATIONS.

There is already some enquiry, chiefly from the Continent, for Canadian Phosphates for delivery during 1887, but as buyers are indisposed to advance upon last season's prices no business has resulted. Ground Canadian testing 60 to 68 per cent. is now likely to become an article of annual importation, and Sellers are disposed to contract for further supplies during the coming season. South Carolina Phosphates. —The possible infliction by the State Legislature of a second dollar export duty upon River Phosphates has caused a slight stiffening in prices, and Raisers are more than ever unwilling to sell at late rates, indeed, contracts have already passed at more money. Some of the manufacturers of Ground Belgian have been obliged to succumb to the unremunerative prices obtainable, and sellers are demanding an advance for their Phosphate, which has become almost a necessity to the trade. The new French Phosphate is now being delivered, and realizing the promises of its sellers. The chemist's report upon two actual shipments made last week show 73.74, 73.85 per cent. Phosphate of Lime, Alumina 0.11, 0.23 per cent, and Oxide of Iron 0.94, 1.09 per cent., respectively. Cambridge and Bedford Coprolites are unchanged, and quoted at 41s. f.o.r., or ground at 48s. in buyer's bags, or 50s. in lent bags, f.o.r., the latter at 26s., f.o.r., or 31s. 6d., f.o.b., Thames.

EXPORTS, 1886.

The report of the Montreal Board of Trade shows that there was exported from that port in 1886, 18,968 tons of phosphate, against 23,849 in 1885, and 20,747 in 1884.

PHOSPHATE IN FRANCE—A NEW DISCOVERY.

The deposit of phosphate of lime discovered about three months ago near Beauval, in the department of the Somme, has proved to be remarkably rich. This deposit had really been located some twenty years ago, but so little attention was then given to its value that, until very lately, these phosphates were sold in the neighborhood as common building sand. Recent complaints having been made about the quality of the sand, one of the owners of the bed took it into his head to have the material analyzed, and then discovered that he owned a perfect bonanza. The analysis of these phosphates shows them to contain 66.43 per cent. phosphate of lime, 5.60 per cent. carbonate of lime, 3.26 per cent. fluoride of lime, and 1.43 per cent. sulphate of lime. The deposit of sand seems to cover the whole of the clay beds of the Beauval district, and varies in thickness from a few inches to 30 and 36 feet. It also fills all the cavities on the surface of the clay. Under the microscope, it shows itself full of shells and infusorial remains. It weighs about 66 pounds to the cubic foot.

A Monster Nugget.

There is at present in Wells, Fargo & Co.'s bank a bit of auriferous rock that any individual might be glad to possess. The nugget is one of the finest unearthed in California, both in size and richness. It is irregular in shape and about the size of an ordinary Derby hat. That there is very little rock and a great deal of gold in it may be determined by its weight, which is thirty-five pounds troy. Quartz of this sort is usually valued at \$200 per pound, and, allowing the large margin of \$1,000 for rock, the nugget would be worth \$6,000. The exposed rock and great gobs of gold that hang out of its sides so as to

nearly hide all other composition and make it appear almost as melted metal, are not jagged or rough, but on the contrary, are smooth and polished in a manner that only water is capable of. The proprietors of the nugget are Messrs. Hayes and Steelman, of Sierra City, and they have left it on exhibition for a few days. At the bank it attracts much attention, but the employees could furnish no information concerning it beyond that it came from Sierra county, near Sierra.

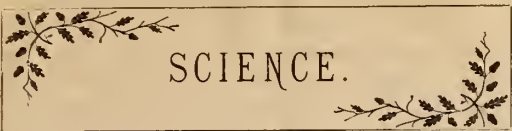
The Continental Iron Trade.

The extreme depression which characterises the Westphalian coal trade can hardly be said to extend to the iron trade in the same district. It is possible that there may be a good deal of exaggeration and undue hopefulness in the estimate formed by those concerned in this industry of their immediate future. But it is quite certain that there is increased activity in the trade, and a growing demand for home ores. Prices also have risen, although not to a very material extent. The advance, however, has been sufficient to induce a number of mining proprietors to reopen mines which had long been standing idle. Blast furnaces, too, are very busy, and the demand is quite equal to the production. In these circumstances, it is not surprising to hear that makers are but little inclined to enter into any contracts extending further than the end of March. While on the subject of the iron trade we may say that prices in Belgium also continue firm. But in France the improvement is exceedingly slow. It is remarkable, indeed, how completely the manufacturers and producers of the French Republic seem to be losing their hold on the world's markets.

The *Colonist* reports that two mines have been discovered right along the C. P. R. line through the Selkirks, but the want of machinery and capital has yet prevented their richness being fully tested. They are both along the Illecille river. One mine, situated at Albert Canon, is only 400 yards from the track. It is said to have a vein of gold bearing quartz 20 feet wide. For the past year a few men have been employed in taking out ore, which has to be shipped to outside points to be assayed, as the necessary machinery has not yet been placed in the mine. There is another mine about ten miles beyond the summit of the Selkirks; it is situated about a mile from the track and fourteen ponies are constantly employed in bringing the ore down the steep slopes of the mountain for transmission. Machinery is to be placed in this mine also next summer.

The introduction of ambulance lectures by professional medical men, by which workmen and others are taught how to act in cases of emergency, has already been the means of saving many lives and it is not too much to say that the foreman and leading workmen of all engineering establishments should be encouraged to attend such lectures free of cost to themselves, even, if necessary, in the time of their employers, as their services, should occasion arise, would be freely given, to the great advantage of the unfortunate sufferer. Even keeping a supply of lint, linen rag and sticking plaster upon the premises is not to be lightly prized, as many a poor fellow who has been struck by a hammer or cut by a flying chip or iron can testify, and such slight mishaps are common enough.

At the last meeting of the directors of the Rabbit Mountain mine the sum of \$20,000 was set apart for the development of the property.



SCIENCE.

OTTAWA LOCAL GEOLOGICAL WORK.

The series of "Monday afternoon lectures" under the auspices of the Ottawa Field Naturalists' Club was inaugurated in January last in the Museum Room of the Ottawa Literary and Scientific Society by Mr. Henry M. Ami, of the Geological Survey Staff. Whilst these lectures are meant chiefly to give these members who desire it an insight into the elementary principles of the various branches of natural science which comes within the pale of the club, there is often added information which bears upon the resources that these several studies seek to investigate and develop, whether in mineralogy, geology, zoology, ornithology, botany or entomology. Mr. Ami had been requested to address the members, and in the course of his remarks which were all of an eminently practical nature to those who desired an insight into that subject as well as to those who sought further information, he briefly sketched the attractions and points of interest which geology affords, presented its aims, and in a lucid manner explained the few leading terms with which it is necessary to become familiar in pursuing such a science, viz.: faults, dislocations, flexures, anticlinal, synclinal, monoclinical, horizontal, inclined, conformity, unconformity and such like in reference to strata and their structure. Having described the various epochs which have been characterized by the introduction or presence of certain types of animal life in the physical history and evolution of the earth up to the present time, the economic minerals to man which were stored up in these several epochs, such as *coal, petroleum, lead, copper, silver, gold, &c., &c.*, the lecturer then applied the principles and elements of the science to the particular district which it is the province of the club to examine—Ottawa and its vicinity. Taking a line of section from King's Mountain, Chelsea, and running it through Parliament Hill at Ottawa a diagram shewing the various geologic formations met in this section was then discussed. The Laurentian system was here represented by two formations, which Sir Wm. Logan referred to as the lower and middle Laurentian formations, characterized by gneiss and gneissoid, as well as nonblendic rocks and crystalline limestones, respectively overlying the former. The next formations met belonged to the Palædgon period, or series, and these rested unconformably upon the upturned edges of the Laurentian rocks. There had been a lapse of time between the deposition of the Laurentian and the deposition of the Potsdam formation, which latter was characterized at its base by a series of coarse conglomerates containing huge rounded pebbles of quartz and other rocks of Laurentian age imbedded in a sandy or arenaceous mixture, as one might find along a modern sea shore or beach. The next formations met were the calciferous, the cherty, the Black river, the Newton, and lastly the Utica formation—all Palædgonic rocks—and in a regular unbroken sequence perfectly conformable one on the other and forming a series of sedimentary strata of considerable thickness (to be ascertained yet) and containing parts of petrified organic remains or fossils, which enable the precise horizon or age of the strata to be ascertained. The newer or Post Tertiary deposits were then casually referred to, as the lecturer purposes presenting this subject before the club at one of its soirees next month,

the subject being, "The great Ice age and subsequent formations at Ottawa."

The work done up to date in geology about Ottawa was then referred to and the workers late and present noticed. There had been considerable work accomplished both in mineralogy and palæontology. There was a great deal yet to be done in all branches of geologic investigation, and a small army of workers would not exhaust the field for a long time.

Ottawa was a particularly favorable spot for researches in geology and mineralogy. It was destined to hold a very conspicuous position, as the neighboring rocks teemed with valuable minerals. The *iron, apatite, epaphyite* and *barytes* of the vicinity were only touched upon by the lecturer as they alone would suffice for lecture upon lecture.

An agreeable discussion took place at the conclusion of the *causerie*, in which, besides the lectures, Mr. McLeod (engineer), Dr. Small, Messrs. Harrington, Whyte and others took part.



BOOK NOTICES.

The great advances made in recent years in the industries of the United States has raised the question in England of American competition in the iron and steel trade. It has been asked if the Americans are in a position to dispense, from time to time, in great measure with English assistance in supplying them with iron, and if the day may come when American producers will not only meet them in all the neutral markets of the world but even extinguish the furnaces of Cleveland and Cumberland, of Scotland and of Wales. About twelve years ago Mr. Isaac Lowthian Bell (now Sir Lowthian) represented the English Government at the Philadelphia Exhibition, and during that visit took the opportunity to investigate into the position and prospects of the American iron industry, and since then he has been a careful observer of its progress.

In a recent issue of the *Fortnightly Review* he contributes an able paper on the "Iron and Steel Trade," in which he deals exhaustively with this question and claims that as long as Great Britain can command raw materials at their present cost there does not appear much chance of the United States offering successful competition to it. Some idea of the value of his paper may be gleaned from the following extracts:—

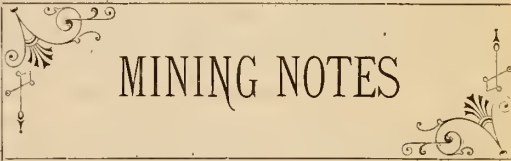
"Upon a recent occasion I constructed a table which was brought down to the years of the largest iron production the world has ever known, viz., 1882 and 1883. In it an estimate was made of the actual quantity of the metal consumed in the United Kingdom and in the United States. It commenced with 1878, when our own country used more iron than any other nation. At that time the United States worked up to 70 per cent. of the weight consumed in this country. In 1883 the figures were almost exactly reversed, i.e., the consumption in the United Kingdom was just about 70 per cent. of that of the United States. The estimate was based on the quantity of pig iron used as such, and the equivalent of pig required in the production of the metal in its more advanced states of manufacture, such as steel, malleable iron, &c."

He states that in 1870 England contributed 51.6% towards the world's output of crude iron, and that our share has steadily fallen to 38.4%. Meanwhile, the United States had advanced from 14.4 per cent. to 20.2. These figures are

up to 1884, but when the returns for 1886 are available it will be found that the United States percentage of the total is much nearer 40 per cent. than 20 per cent.

He mentions that whereas the area of English coal deposits is but 7,000 or 8,000, the United States measures underlie 200,000 square miles. On the other hand he thinks that the iron ore deposits of the United States are very little, if at all, more extensive than English beds of ironstone.

In 1870 twenty-nine million tons of coal were raised in the United States; but, in 1885, one hundred and two million tons were extracted, an increase of 248 per cent. During the same period British coal output rose from one hundred and ten million tons to one hundred and fifty-nine million tons, an increase of 44 per cent. Sir Lowthian Bell lays stress on the advantage the home manufacturers possess by reason of the proximity of the ores to the fuel in Great Britain and he refers to the royalties payable there, which greatly add to their cost of production. He estimates that the royalties work out thus:—"Made from the Lias ironstone, amount to 3s.; made from ordinary clay ironstone in Scotland, 3s.; made from Blackband clay ironstone in Scotland, 4s. 10d.; made from hematite in Cumberland and Lancashire, 6s. 3d. In Germany they only come on the ton of pig iron to about 6d. In France they only come on the ton of pig iron to about 8d."



MINING NOTES

Nova Scotia.

The returns from the Oldham gold mining property for the past three months are as follows

October, - - - -	115 19 oz.
November, - - - -	61 2
December, - - - -	109 28

We are informed that the proprietor cleared \$2,165, the value of a gold brick from the mine. It weighed 113 oz. 18 dwts., and was the result of one month's work by 20 men.

The output of the Springhill mines for December, reached the unprecedented figures of 43,026 tons, which closes the year with a total of 468,000 tons, an increase of 118,000 tons over 1885. The collieries are kept busy at their utmost capacity, and give employment to between eleven and twelve hundred men and boys. The South Slope is being opened out and 200 tons of coal hoisted and shipped daily. Other preparations are being made for a further increase of business this year. Shipments of coal by water from Parrsboro, in 1886, were 40,508 tons, against 26,215 in 1885.

It may not be generally known says the *Critic*, that an American company from Pennsylvania has been boring for oil in the Memramcook Valley, Westmoreland County. They have acquired large areas of territory and within the past three or four years have sunk quite a number of wells, but without success as yet. At present they are boring in what is known as the old Ayers Mill property, about 3 miles northwest of the Memramcook Station. As they have spent large sums of money it is to be hoped that their efforts will be crowned with success. Hon. A. D. Richard, barrister of Dorchester, is solicitor of the company.

Some five or six carloads of matte from the Mineral Vale property, New Ireland, Albert County, have been forwarded for export to Swansea. The value of the matte is placed at \$100 per ton.

An endeavor is being made to engage Nova Scotian miners for work at the Bow River coal mines, N.W.T.

The West mine, Rawdon property, has been sold to Minnesota capitalists, and new machinery including a new 20-horse power engine and boiler is to be added, while steam hoisting and pumping gear will supersede the work now done by horse power. Mr. Dissoway, lately of Mooseland, Tangier district, is mentioned as the new manager.

The main shaft at the east mine, McNaughton property, is now down some 500 feet. A fire recently broke out in one of the buildings, and might have proved a serious conflagration but for the speedy action of the miners, who quickly extinguished it. Some damage, however, was done to the roof of the mill building.

Referring to the very large increase in the output and shipment of coal from the mines of Nova Scotia during the past year, the *Montreal Gazette* in an editorial very clearly points out that this is in very large measure due to the policy of protection adopted by the province. It states the case thus: "With the product of their mines shut out of the United States, and the market of the Upper provinces taken away from them by the competition of United States collieries, the home consumption of the province itself would have afforded employment to but a fraction of the number of miners now actively at work, and an immense amount of capital invested in coal properties would have been deprived of its earning power. As it is, under the protection policy, means of livelihood are afforded within the country to thousands of miners; Canadian vessels and Canadian railways, instead of United States railways, are occupied in the transportation of the product, and large sums of money that would otherwise be sent to foreign lands in payment for coal and freights are kept within the Dominion. And the benefit is not alone to the province, for the supplying of the families of the miners affords a market for the factories and work people of other parts of Canada, to the mutual advantage of each.

The value of the gold exports from this province, for the month of December, amounted to \$18,000.

Gold has been discovered in Hants County, near Ardoise Hill, and at a point about four miles from Mount Ninack. Indications said to be good.

The Egerton Gold Mining Company with a capital of \$40,000, are preparing to open up the Fifteen Mile Stream Gold mine, while it is reported that an American syndicate have purchased extensive copper and iron deposits in Cape Breton, and that the product of the Spring Hill mines for December was larger than ever before. All the different gold districts are being worked to great advantage. Salmon River, Lake Catcha, Cariboo, Moose River, Rawdon, Renfrew, Oldham, Brookfield, and Caledonia districts are yielding regular returns, and Mooselands, Gold River, Malaga Lake, Milipsigate Lake, Mill Village, Carleton and Kemptville, are being rapidly developed, and when the mills in course of construction are finished, will swell the

list of gold producers. Gold has been discovered in Annapolis County, and prospectors in all parts of the Province are preparing for a vigorous campaign as soon as the snow leaves in the spring, and many new and important discoveries will almost certainly be made during the present year.

During the month of December 30 tons of quartz were crushed at the McEwen mines, which yielded 85½ ounces.

Ontario.

PORT ARTHUR DISTRICT.

The ore at the Silver Falls mine is said to be averaging \$28.00 to the ton, with good indications.

The *Sentinel* announces that the latest assays from taken at the Palisade mine realised \$100 per ton.

The shaft at Silver Falls mine is now down about 55 feet. Two recent assays give 18½ and 28½ oz. of silver to the ton.

Work is suspended until the spring at the Silver Hill property. Major Bell is now in England endeavoring to sell the property or to secure a company to develop it.

Two hundred and eight feet have been sunk at the Rabbit Mountain mine.

Few matters so materially affect the well being and wealth of both Eastern and Western Algoma, as the present mining regulations of Ontario. Under them, if a man has money, he has only to employ a surveyor, make an affidavit that there are indications of mineral or metals on the land he wishes to grab, and by paying two dollars an acre, purchase as large a tract of land as his purse will allow, and except upon the small portion reserved for public roads, no person can trespass. This system exists throughout the district, is fast becoming a very serious check to its proper development, and should be promptly put a stop to. The Silver Islet mining company, who operate a spot of a little over an acre in extent, have 27,000 acres thus locked up, whilst there is probably about six times that amount held by speculators in grants of from two hundred acres and upwards.

Recent specimens from the Jarvis property are said to be expected to assay from \$15.00 to \$30.00 per ton. These samples have been brought to Port Arthur by Mr. A. S. McEwan.

A limited liability company, says the *Engineering and Mining Journal*, has been organized in London, with a capital stock of £100,000, shares £1 each, to acquire 240 acres in extent, freehold, consisting of two mining locations on Silver Mountain (Shuniah Weachu), in the Thunder Bay District, on Lake Superior. The vendors receive 25,000 shares and £30,000; 9,000 fully paid-up shares will be allotted to directors in lieu of remuneration for two years, and to other parties for services rendered. The mine is about twenty miles from the Canadian Pacific Railroad, and ten miles west of Port Arthur. Messrs. Frank Tobin and James Nancarrow, M.E., visited the mines in October, and upon their report, which is very unsatisfactory and indefinite one, and which affords no basis whatever for the price asked for the property, its purchase was completed. Messrs. R. J. Battle and E. C. Garlick, mining engineers, of Cleveland, also made equally unsatisfactory reports.

British Columbia.

The latest discovery of coal is reported from Tumbo Island, in the Straits of Haro. The deposits are reported large, and the quality of the coal excellent. A company has been formed to develop the deposit.

Since the year 1858, when the first great rush to the gold fields of the Fraser occurred, until the present date, fully \$50,000,000 in gold dust has been yielded from the mines, and competent authorities state as yet that they have only been scratched over—only the easier secured and rich paying deposits have been worked. Certain it is that as yet the country remains only prospected around the famous fields, and that in many sections of the gold belt nothing has been done. There are in Cariboo and other districts to-day known mining grounds that will richly repay a moderate expenditure of capital in hydraulic mining on improved principles. But this is not the class of mining that is now looked forward to as likely to prove one of the greatest—if not the principal—industries in the province. Recent examinations by mining experts, prospectors, and others who were in a position to judge, have all been productive of highly favorable reports as to the richness and extensive character of the mineral deposits in Cariboo, Yale, Kootenay and other districts. In many places work has commenced and machinery has been placed in position. Capitalists have signified their intention of investing, and everything is now tending towards an extensive treatment of the mineral bearing rocks of the province, and especially of gold. Should results prove, as there is good reason to anticipate, the gold mining industry will branch into a permanent and lucrative one, and one that will hasten the progress of the province.—*Colonist*.

During the past season four strong companies have been engaged on McCullough creek. The Ophir Bedrock Flume Co. commenced work at the mouth of McCullough creek last summer, and have about three hundred feet of ground sluice constructed. Mr. Gray is delaying the clean up as long as possible in these works so that the preparations for putting in hydraulic power may not be interrupted. In the meantime they are starting a tunnel which will enable them to continue work throughout the winter. There is undoubtedly a considerable sum of money now in the Ophir Co's flume, as nuggets of good size have been picked out of the face frequently during the past few months. Indications show that bedrock is not far ahead, and Mr. Bray intends to have a "giant" with the other necessary machinery on the ground in good time to take advantage of the spring flow of water in the creek.

The Baldhead Co. are drifting in their claim a mile and a half above Gray's.

Above the Baldhead claim is the Erickson; their tunnel has been shut down during the close season, or until such time as the Selkirk company's tunnel (immediately above) has been pushed forward to bedrock, these two companies having arranged to co-operate in prospecting the Selkirk claim.

While undermining some coal, which a previous shot had failed to bring down, at No. 1 Esplanade shaft of the Vancouver coal company, a miner was lately crushed to death by the mass falling upon him.

We are informed by the *Critic* that notice has been given that letters patent for the incorporation of a joint stock company, to be called the Montreal Manganese Mining Company, for the

mining of manganese and other minerals in the County of Hants or elsewhere in the province, has been applied for pursuant to statute.

The chief place of business in Nova Scotia will be Maitland, and the intended capital stock is \$100,000, to be divided into ten thousand shares of ten dollars each.

H. T. Harding is solicitor for the applicants. The provisional directors of the company are to be H. T. Harding, David Andrews, and Thomas Ralph. The Hon. David McLelan, Provisional Secretary of New Brunswick, J. T. McBride of Montreal, and W. R. Stockbridge, broker of Boston, are prominent amongst the applicants.

Hants County is celebrated for its large deposits of manganese, and we are glad to note that a company with plenty of capital to work them will soon be in active operation. We are informed that the new company will purchase extensive manganese properties near the Shubenacadie River.

EASTERN TOWNSHIPS.

COPPER AND OTHER MINING PROPERTIES BELONGING TO MR. WM. FARWELL, SHERBROOKE.

DESCRIPTIVE NOTES BY CAPTAIN FRANCIS BENNETT MINING ENGINEER.

TOWNSHIP OF ASCOT.

The Pyrites region of the Township of Ascot, in the Province of Quebec, has proved to be one of the most important in Canada. The ore consists of Pyrites, containing from 3 to 4 per cent. Copper, and from 35 to 45 per cent. Sulphur. It occurs in veins in micaceous and chlorite slates, associated with silicious and calcareous matter. The discovery of gold and silver accompanying these ores gives additional importance to the region.

The properties in this Township, now offered for sale, consist of the following Mines and Mining Lands:

1st. CLARK MINE, Lot 11, in the 7th Range, 187 acres, in fee-simple.

This mine is situated towards the centre of the mining region above described. It has been somewhat extensively worked, and a considerable quantity of ore extracted. The principal mining work has been done by means of open cutting on a vein about 18 feet thick, and containing about $3\frac{1}{2}$ per cent. copper. Other veins are known to traverse the property.

The mine is about a mile and a half from the Lennoxville station of the Grand Trunk Railway, and $2\frac{1}{2}$ to 3 miles from the City of Sherbrooke.

2ND. SHERBROOKE MINE—Part of Lots 12 and 13 in the 7th Range, 329 acres in fee-simple.

This mine immediately adjoins and is traversed by some of the same Pyrites veins as the Clark Mine, besides some others not embraced in that property. The Sherbrooke Mine property has been extensively explored at surface, but with the exception of a trial shaft (said to be 60 feet deep) it has not been opened up by underground workings. The value of the property is established by the known existence in it of wide veins of Pyrites of which one of the exploratory pits shows a vein of from 8 to 10 feet in width, of which a part yields over 5 per cent. metallic copper. Specimens from this vein are said to have also yielded, according to competent

authorities, from four to five dollars per ton of gold, eleven dollars per ton of silver, with from 35 to 40 per cent. sulphur.

This mine is a little over a mile from the Lennoxville station of the Grand Trunk Railway, and $2\frac{1}{2}$ miles from the City of Sherbrooke.

3rd. BELVIDERE MINE.—Part of Lots 9 and 10 in the 9th range; W $\frac{1}{2}$ Lot 10 in 8th range; 292 acres in fee-simple.

The general condition of the rocks and ores on this property are similar to those of the Clark and Sherbrooke Mines. The workings consist of a shaft, sunk 100 feet on a vein of between six and seven feet wide, rich in Sulphur, and yielding Copper Ores of from 3 to 4 per cent. of that metal.

The following is Sir William Logan's description of this Mine, as given in his general report for 1863, viz:—

"Here there is a considerable breadth of fine white micaceous slates, with which interstratified a bed of greenish quartz, or mica schist; this is in parts chloritic, or talcose, and contains large quantities of a mixture of iron pyrites, with yellow copper ore. Select portions of this gave, when dressed, one-half the weight of ore, which contained one-third of silicious matter, and 7.3 per cent. of copper, the remainder being iron and sulphur. The breadth of this bed is about six feet, and it is estimated that it will yield two tons of dressed ore similar to the above to the fathom."

Other Pyrites beds are known to exist on this property, which is situated from $2\frac{1}{2}$ to 3 miles from a railway.

At the time operations were suspended at the foregoing mines, the value of the sulphur in the ores was not recognized, and it was chiefly on account of its presence in large quantities that the mines were closed.

4th. ASCOT PROPERTIES.—Part Lots 12 in the 7th Range; 12 in the 8th Range, and 14 in the 8th Range; 171 acres, mining rights.

The bands of Copper-bearing rocks are known to traverse these properties, which however have not yet been developed by mining operations.

5th. MORRILL LANDS, as per accompanying list, 1,300 acres in fee-simple.

Originally taken up for Gold mining purposes, discoveries of that metal which were deemed important having been made on adjoining properties—apart from their value in this respect, they are heavily timbered, and would be found useful for the supply of firewood, and timber for use at the Mines.

The Waterloo and Magog Railway (in connection with the Vermont Central R.R.) passes through a part of this property.

TOWNSHIP OF ORFORD.

8th. CARBUNCLE HILL MINE, as per accompanying list, comprises 718 acres of land, in fee-simple.

This mining property is situated in the heart of a mineral region, which combines many of the most essential characteristics, both for the extensive deposition and profitable working of copper and other ores. The rocks consist of chloritic slate, serpentine and diorite, and the metallic veins occur towards the line of contact of these distinct varieties of rock. On the property referred to, several distinct and well defined veins or beds of yellow sulphuret of copper occur, and have been traced by exploratory works along the brow of a hill, elevated about 800 feet above the level of Brompton Lake, situated about half a mile to the east. A small opening on one of the veins, which crops out on the face of the cliff, shows a thickness of five feet, yielding a considerable quantity of yellow

sulphuret of copper of about 12 per cent. of that metal. No regular mining operations have been made on the property, but the copper-bearing veins are proved by surface explorations and by natural exposures to extend over a large proportion of it. The property is now about 11 miles from the nearest railway, but a railway—now projected, and most probably very soon to be constructed—will pass through it, or within a very short distance.

TOWNSHIP OF CLEVELAND.

9th. ST. FRANCIS MINE.—S. E. $\frac{1}{4}$ Lot 25, in the 12th Range; 50 acres in fee-simple.

On this very promising mine, which is situated about three miles from the Richmond station of the Grand Trunk Railway, a very considerable amount of mining work has been done, and with most encouraging results. A well defined vein, richly charged with vitreous purple and yellow sulphurets of copper, traverse the entire length of the property, or about half a mile, cutting chloritic slates, the gangue being a mixture of quartz and calespar. The vein is from three to five feet thick, and for a considerable length in the parts worked yielded an estimated average of two tons of 8 per cent. copper ore per fathom, (some portion being estimated to have yielded as much as one ton and a half of 40 per cent. copper ore per fathom). The plant on the mine consists of dwelling houses, smith's shop, ore sheds, office, etc., 1 large winding and pumping steam engine with boiler, winding and pumping gear, about 40 fathoms Cornish lifting pumps complete, railway tracks, ladders, etc.

TOWNSHIP OF GARTHBY.

10th. GARTHBY MINE.—A large block of lands, for the most part unexplored, comprising (as per accompanying list) an aggregate of 2,938 acres, in fee-simple.

On one of the lots comprised in this property, there appears to be a large bed or vein of Pyrites, the entire thickness in which the Pyrites are mingled with the rock being about twenty feet; on another lot and near the main road leading to the mine there is the outcrop of a vein of from 3 to 4 feet wide of solid Pyrites.

Samples of copper ore have been broken on this property that have yielded by assay as much as twenty-two per cent. of copper, while other samples were found to be free from copper. An analysis of the pyrites apparently free from copper, gave: sulphur 48 per cent., copper 1.1 per cent., iron 42 per cent., silica, etc., 8.9 per cent. As the ore contains such a large percentage of sulphur, it is peculiarly adapted for the manufacture of sulphuric acid.

The distance of the mine from the Garthby station of the Quebec Central Railway, (to which a tramroad could be cheaply made), is from four to five miles, and a railway is now chartered which it is expected will run through these lands.

ACTON.

11th. ACTON MINE.—Part Lot 32 in the 3rd Range; 100 acres in fee-simple.

This mine has proved to be one of the most productive and profitable in the Province of Quebec. Within three years after the mine was opened it had produced ores to the value of nearly \$500,000. The ore, which consists chiefly of the purple and yellow sulphuret of copper, is distributed throughout a thickness of from 200 to 300 feet of dolomitic limestone, and is occasionally found in masses of exceeding richness. From three of these masses 16,300 tons of 12 per cent. copper ores were excavated by open cut-

ting. This mine gave employment in 1861 to between 500 and 600 hands, and although its character as a good mine for permanent and profitable working has been very much impaired by the limited regard given to exploratory works, it is highly probable that the ore is still very far from being exhausted. Sir William Logan is reported to have said of this mine:

"Little has been done for discovery, and it cannot be said how near to the present floor of the mine may be found other masses similar to those that have been excavated."

This mine is situated about half a mile from the Actonvale station of the Grand Trunk and South Eastern Railways, about fifty miles from Montreal.

TOWNSHIP OF BROME.

12th. BROME MINE.—Part of Lots Nos. 2 and 3 in the 4th Range, 50 acres in fee-simple.

This property is situated in a region that has deservedly attracted much attention from mining investors. It is characterized by the occurrence of very thick and persistent embedded veins of rich sulphuret of Copper. The mine in question lies on the strike of some of the most important of these, and is in the immediate vicinity of a railway.

TOWNSHIP OF BOLTON.

13th. BOLTON MINE: As per accompanying list 400 acres in fee-simple.

This property is situated between that of the Huntington Mining Company on the south, and the Ives Mining Company on the north, occupying the space between these two properties, and traversed by the veins that have been so extensively worked in the Huntington Mine. About the middle of this property two shafts have been sunk on the vein, to a depth of between 60 and 70 feet. These shafts are connected at this depth by a drift, in which the vein is about six feet wide, composed principally of Iron Pyrites containing large patches of very rich yellow copper ore.

This Mine is about 2 miles from the Eastman Station of the Waterloo and Magog Railway.

TOWNSHIP OF CHESTER WEST.

14th SHAW MINE: As per accompanying list comprises Mining rights; total 630 acres.

Copper bearing beds, apparently of much importance have been discovered and partially developed upon this property. On one of these beds a trial shaft has been sunk to a depth of 40 feet, shewing a thickness of between two and three feet, charged with purple and yellow copper ore to the extent of 4 per cent. metalliferous band of rocks at this place is said to be from 40 to 50 feet, and it has been traced for about 500 feet. Other promising veins crop out in the property, but no regular Mining operations have yet been done on it.

15th. VIGER MINE.—As per list comprises Mining rights, total 1,255 acres:

This property is traversed by several copper bearing quartz veins in chloritic and micaceous schist, which, apart from the quartz veins yields rich vitreous copper bearing rock being about 170 feet. The principal vein has been exposed at surface, over a length of nearly half a mile by shallow pits, from which a considerable quantity of rich copper ore has been incidentally obtained. Two Adit levels, for which the ground is highly favorable, have also been driven to prove the veins in depth, with results that are represented as being highly satisfactory.

This mining property is about 15 miles from the Arthabaska station of the Grand Trunk Railway.

LIST OF LANDS.

Township.	Property.	Nos. of Lots.	Range.	Acres.	TITLE.	
					Fee sim.	Min. rghts.
Ascot	Clark Mine	11	7	187	acrs	acrs
do	Sherbrake Mine	Part 12 and 13	7	329	187	329
do	Belvidere Mine	Part 9 and 10	9	139		
do	do	W ½ of E ½ 10	9	50		
do	do	W ½ 10	8	100		
do	do	Pt N.W. end 10	8	3	292	
do	Ascot Properties	Part 12	7	106		
do	do	" 12	8			
do	do	" 14		65	171	
do	Morril Lands	W ½ 7	81	100		
do	do	Lot 4	13	210		
do	do	" 5	13	200		
do	do	" 1	14	200		
do	do	" 2	14	200		
do	do	" 3	14	200		
do	do	" 4	14	200		
Orford	Carbuncle Hill Mine	" 2	14	65	1300	
do	do	" 3	14	53		
do	do	" 2	1	200		
do	do	" 3	15	200		
do	do	" 4	15	210		
Cleveland	St. Francis Mine	SE ¼ SW ¼ 25	12	50	718	
Garthby	Garthby Mine	5, 6, 7	1st Nth.	150	50	
do	do	8, 9, 10, 11	"	200		
do	do	14, 15, 16, 17	"	200		
do	do	20, 21, 22, 23	"	200		
do	do	24, 25, 26, 27	"	200		
do	do	25, 26, 17	2nd Nth	246		
do	do	7, 8, 9, 10	1st Sth.	200		
do	do	11, 12, 13, 14	"	200		
do	do	19, 20, 21, 22	"	200		
do	do	23, 24, 25, 26	"	200		
do	do	27, 28, 29	"	150		
do	do	12, 13, 14, 15	2nd Sth.	200		
do	do	16, 17, 18, 20	"	200		
do	do	21, 22, 23	"	150		
do	do	24, 25, 26, 27	"	242		
Acton	Acton Mine	Part 32	3	109	2938	
Brome	Brome Mine	Part 2 and 3	4	50	100	
Bolton	Bolton Mine	5, 6, 7	8	300	50	
do	do	E ½ 5	18	100		
Chester W	Shaw Mine	North ½ 10	6	105	400	
do	do	11	6	210		
do	do	9	6	210		
do	do	South ½ 10	6	105	315	
do	Viger Mine	A	Craig S.	448		
do	do	A	Craig N.	85ar		
do	do	8	6	211ar		
do	do	South ½ 12	6	105		
do	do	Part 8	7	69		
do	do	" 14	7	45		
do	do	North ½ 12	6	105	963	
do	do	S E ¼ 13	6	52½		
do	do	Part 14	7	53		
do	do	" 14	8	81½	292	

SUMMARY.

Townships.	Fee Simple.	Mining Rights.	Total Amounts.
Ascot	Acres. 2669	Acres. 171	Acres. 2840
Orford	718		718
Cleveland	50		50
Garthby	2938		2938
Acton	100		100
Brome	50		50
Bolton	400		400
Chester West	1278	1885	....
	8203	2056	7096

FOR SALE.

LOT NO. 17, RANGE 7,

TOWNSHIP OF PORTLAND EAST,

COUNTY OF OTTAWA.

Continuation of the North Star Vein. Partly developed and shewing very high indications.

For particulars apply to

Dr. VALADE, Ottawa.

Or to the Office of the

CANADIAN MINING REVIEW.

Late Items.

NOVA SCOTIA.

Since the collapse of the Albion mine affairs have been quiet in the Montague District, but now comes news of a promising strike on the Montreal areas. A small lead has been proved and the quartz which was crushed at the Baker or Annand Mill proved good for 2 oz. to the ton.

The Oxford mine is looking well, and prospecting with most encouraging results is going on on the Anderson, Cogswell, and McKay areas. The richest leads seem to run into or through a swamp, which could be drained at small expense. These areas are held by parties who will not work them, and what the miners consider the best part of the district, good they say for millions, is now lying idle. The swamp could be drained for a few hundred dollars, and then all difficulty in working the properties would be overcome.

The following are the official returns for the month of January, so far as received at the Mines Office:

District.	Mill.	Tons.	Oz.
Whiteburn	Barber & Douglas Co.	25	16
East Rawdon	Rawdon	555	244½
Dar's Hill, Salmon River	The Dufferin	827	262
Lake Catcha	Oxford	49½	355¾
Sherbrooke	Cummings	18	11½
Cariboo	Moose River G.M. Co's	219¼	162¼

TO MINE OWNERS AND CAPITALISTS.

CHAS. M. DOBSON, A.R.S.M., LON.,

REPORTS ON

Mines and Mining Properties.

Certified Mining Engineer, London, Eng., prospector for the West African Gold Mines (Akankoo). Has examined Mines of all descriptions for English Capitalists. Consulting and Practical Mining Engineer. Lodges located prospected, assayed, and taken into the English market.

Address this office, or

189 Queen Street, Ottawa.

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FARM LANDS FOR SALE IN MANITOBA.

2560 Acres of Splendid Prairie Farm Lands, Class 1.

The Manitoba and Northwestern Railway runs through the district in which these lands are situated.

Section	3	14	23	640 Acres.
"	15	14	23	640 "
"	17	14	23	640 "
"	19	14	23	640 "

Title direct from the Crown. Well settled districts surround these lands, and good roads to them.

Terms of Payment reasonable.

APPLY THIS OFFICE.

McINTYRE, LEWIS & CODE,
Barristers, Solicitors & Notaries Public.

Conveyancing of Properties and Mineral Rights.

OFFICES: - - - UNION CHAMBERS, OTTAWA,

(Adjoining Canadian Mining Review Office.)

ALEX. F. McINTYRE. | TRAVERS LEWIS. | W. J. CODE.

WOLFF & COTTON,

Provincial Land Surveyors,

ONTARIO AND QUEBEC.

OFFICE, - 52 Elgin street, Ottawa.

(Opposite Russell House.)

J. OBALSKI,**MINING ENGINEER,**

Will examine and report on mines, and make analyses.

Office, 63 St. Gabriel street, Montreal.

CONSULTATION FREE!

WM. HAMILTON MERRITT, F. C. S.,

Associate Royal School of Mines, &c.,

Mining Engineer and Metallurgist,

Will report on Mines and Mineral Properties.

ADDRESS:

15 TORONTO ST., TORONTO, ONT.

FOR SALE.

A No. 1

Prospecting Drill,

With new steel boiler and complete outfit.

Apply to

ROBERT GEE,

270 ST. JAMES ST., - MONTREAL.

**Notice to Contractors.**

SEALED TENDERS addressed to the undersigned, and endorsed "Tender for New Examining Warehouse, &c., Ottawa," will be received at this office until Tuesday, 1st March, for the several works required in the erection and completion of the

NEW EXAMINING WAREHOUSE, ETC.,
AT

OTTAWA.

Plans and specifications can be seen at the Department of Public Works, Ottawa, on and after **MONDAY, 14th February.**

Intending contractors should personally visit the site and make themselves fully cognizant of the work to be done, according to the said plans and specifications, before putting in their tenders.

Persons tendering are further notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures.

Each tender must be accompanied by an *accepted* bank cheque made payable to the order of the Honorable the Minister of Public Works, *equal to five per cent.* of the amount of the tender, which will be forfeited if the party decline to enter into a contract when called upon to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,

A. GOBEIL,
SecretaryDepartment of Public Works,
Ottawa, 27th January, 1887.**Notice to Contractors.**

SEALED TENDERS addressed to the undersigned, and endorsed "Tender for Ice, Public Buildings," will be received at this office until Monday, the 14th February instant, for filling the Government ice house at the Rideau Canal Basin, Ottawa.

Sealed tenders endorsed "Tender for Ice, Rideau Hall, &c.," will also be received at the same time for filling the ice house at the Governor General's Residence, Rideau Hall.

Tender to state price per block of the following dimensions, viz.:—3 ft. by 1 ft. by 1 ft., which price must include cost of packing and of the sawdust required for that purpose.

The ice to be measured before being packed in the ice house and payment to be made accordingly.

N.B.—The ice must be taken from the Ottawa River, above the Chaudiere Falls.

By order,

A. GOBEIL,
Secretary.Department of Public Works,
Ottawa, 5th Feb., 1887.**MINING REGULATIONS**

To Govern the Disposal of
Mineral Lands other than Coal Lands,
1886.

THESE REGULATIONS shall be applicable to all Dominion Lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, iron, or other mineral deposits of economic value, with the exception of coal.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein, either by surface or subterranean prospecting, for mineral deposits, with a view to obtaining under the Regulations a mining location for the same, but no mining location or mining claim shall be granted until the discovery of the vein, lode, or deposit of mineral or metal within the limits of the location or claim.

QUARTZ MINING.

A location for mining, except for iron, on veins, lodes, or ledges of quartz or other rock in place, shall not exceed forty acres in area. Its length shall not be more than three times its breadth, and its surface boundry shall be four straight lines, the opposite sides of which shall be parallel, except where prior locations would prevent, in which case it may be of such a shape as may be approved of by the Superintendent of Mines.

Any person having discovered a mineral deposit may obtain a mining location therefor, in the manner set forth in the Regulations which provide for the character of the survey and the marks necessary to designate the location on the ground.

When the location has been marked conformably to the requirements of the Regulations, the claimant shall, within sixty days thereafter, file with the local agent in the Dominion Lands Office for the district in which the location is situated, a declaration or oath setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as aforesaid; and shall, along with such declaration, pay to the said agent an entry fee of **FIVE DOLLARS**. The agent's receipt for such fee will be the claimant's authority to enter into possession of the location applied for.

At any time before the expiration of **FIVE** years from the date of his obtaining the agent's receipt, it shall be open to the claimant to purchase the location on filing with the local agent proof that he has expended not less than **FIVE HUNDRED DOLLARS** in actual mining operation on the same; but the claimant is required before the expiration of each of the five years, to prove that he has performed not less than **ONE HUNDRED DOLLARS** worth of labor during the year in the actual development of his claim, and at the same time obtain a renewal of his location receipt, for which he is required to pay a fee of **FIVE DOLLARS**.

The price to be paid for a mining location shall be at the rate of **FIVE DOLLARS PER ACRE**, cash, and the sum of **FIFTY DOLLARS** extra for the survey of same.

Not more than one mining location shall be granted to any individual claimant upon the same lode or vein.

IRON.—The Minister of the Interior may grant a location for the mining of iron, not exceeding 160 acres in area, which shall be bounded by north and south and east and west lines astronomically, and its breadth shall equal its length. Provided, that should any person making an application purporting to be for the purpose of mining iron thus obtain, whether in good faith or fraudulently, possession of a valuable mineral deposit other than iron, his right in such deposit shall be restricted to the area prescribed by the Regulations for other minerals, and the rest of the location shall revert to the Crown for such disposition as the Minister may direct.

The Regulations also provide for the manner in which land may be acquired for milling purposes, reduction works, or other works incidental to mining operations.

Locations taken up prior to this date may, until the 1st of August, 1886, be re-marked and re-entered in conformity with the Regulations without payment of new fees, in cases where no existing interests would thereby be prejudicially affected.

PLACER MINING.

The Regulations laid down in respect of quartz mining shall be applicable to placer mining as far as they relate to entries, entry fees, assignments, marking of localities, agents' receipts, and generally where they can be applied.

The nature and size of placer mining claims are provided for in the Regulations, including bar, dry, bench, creek or hill diggings, and the **RIGHTS AND DUTIES OF MINERS** are fully set forth.

The Regulations apply also to

RED-ROCK FLUMES, DRAINAGE OF MINES AND DITCHES.

The **GENERAL PROVISIONS** of the Regulations include the interpretation of expressions used therein; how disputes shall be heard and adjudicated upon; under what circumstances miners shall be entitled to absent themselves from their locations or diggings, etc., etc.

THE SCHEDULE OF MINING REGULATIONS

Contain the *forms* to be observed in the drawing up of all documents, such as:—"Application and affidavit of discoverer of quartz mine." "Receipt for fee paid by applicant for mining location." "Receipt for fee on extension of time for purchase of a mining location." "Patent of a mining location." "Certificate of the assignment of a mining location." "Application for grant for placer mining and affidavit of applicant." "Grant for placer mining." "Certificate of the assignment of a placer mining claim." "Grant to a bed-rock flume Company." "Grant for drainage." "Grant of right to divert water and construct ditches."

Since the publication, in 1884, of the Mining Regulation to govern the disposal of Dominion Mineral Lands, the same have been carefully and thoroughly revised with a view to ensure ample protection to the public interests and at the same time to encourage the prospector and miner in order that the mineral resources may be made valuable by development.

COPIES OF THE REGULATIONS MAY BE OBTAINED UPON APPLICATION TO THE DEPARTMENT OF THE INTERIOR.

A. M. BURGESS,*Deputy Minister of the Interior.*



The Intercolonial Railway of Canada,

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—AND THE—

Direct Route between the West and all points on the Lower St. Lawrence and Baie des Charleux, also New Brunswick, Nova Scotia, Prince Edward Island, Cape Breton, Newfoundland, Bermuda and Jamaica.

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Superior Elevator, Warehouse and Dock accommodation at Halifax for shipment of grain and general merchandise.

Years of experience have proved the Intercolonial in connection with Steamship lines to and from London, Liverpool and Glasgow to Halifax, to be the quickest freight route between Canada and Great Britain.

Information as to Passenger and Freight rates can be had on application to

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27 Sparks street,
Opposite the Russell, OTTAWA.

ROBT. B. MOODIE,

Western Freight and Passenger Agent,
93 Rossin House Block,
York St., TORONTO

D. POTTINGER,

Chief Superintendent.

Railway Office, Moncton, N.B.,
Nov. 22nd, 1886.



Notice Respecting Passports.

PERSONS requiring passports from the Canadian Government should make application to this Department for the same, such application to be accompanied by the sum of four dollars, in payment of the official fee upon passports as fixed by the Governor-in-Council.

G. POWELL,

Under Secretary of State.

Ottawa, 19th Feb., 1886.



DEPARTMENT OF INLAND REVENUE.

An Act respecting Agricultural Fertilizers.

THE public is hereby notified that the provisions of the Act respecting AGRICULTURAL FERTILIZERS came into force on the 1st of January, 1886, and that all Fertilizers sold thereafter require to be sold subject to the conditions and restrictions therein contained—the main features of which are as follows:—

The expression "fertilizer" means and includes all fertilizers which are sold at more than TEN DOLLARS per ton, and which contains ammonia or its equivalent of nitrogen, or phosphoric acid.

Every manufacturer or importer of fertilizers for sale, shall, in the course of the month of January in each year, and before offering the said fertilizer for sale, transmit to the Minister of Inland Revenue, carriage paid, a sealed glass jar, containing at least two pounds of the fertilizer manufactured or imported by him, with the certificate of analysis of the same, together with an affidavit setting forth that each jar contains a fair average sample of the fertilizer manufactured or imported by him; and such sample shall be preserved by the Minister of Inland Revenue for the purpose of comparison with any sample of fertilizer which is obtained in the course of the twelve months then next ensuing from such manufacturer or importer, and which is transmitted to the chief analyst for analysis.

If the fertilizer is put up in packages, every such package intended for sale or distribution within Canada shall have the manufacturer's certificate of analysis placed upon or securely attached to each package by the manufacturer; if the fertilizer is in bags, it shall be distinctly stamped or printed upon each bag; if it is in barrels, it shall be either branded, stamped or printed upon the head of each barrel, or distinctly printed upon good paper and securely pasted upon the head of each barrel, or upon a tag securely attached to the head of each barrel; if it is in bulk, the manufacturer's certificate shall be produced and a copy given to each purchaser.

No fertilizer shall be sold or offered or exposed for sale unless a certificate of analysis and sample of the same shall have been transmitted to the Minister of Inland Revenue, and the provisions of the foregoing sub-section have been complied with.

Every person who sells, or offers or exposes for sale, any fertilizer, in respect of which the provisions of this Act have not been complied with—or who permits a certificate of analysis to be attached to any package, bag or barrel of such fertilizer, or to be produced to the inspector, to accompany the bill of inspection of such inspector, stating that the fertilizer contains a larger percentage of the constituents mentioned in sub-section No. 11 of the Act than is contained therein—or who sells, offers or exposes for sale, any fertilizer purporting to have been inspected, and which does not contain the percentage of constituents mentioned in the next preceding section—or who sells, offers or exposes for sale, any fertilizer which does not contain the percentage of constituents mentioned in the manufacturers' certificate accompanying the same, shall be liable in each case to a penalty not exceeding fifty dollars for the first offence, and for each subsequent offence to a penalty not exceeding one hundred dollars. Provided always, that deficiency of one per centum of the ammonia or its equivalent of nitrogen, or of the phosphoric acid, claimed to be contained, shall not be considered as evidence of fraudulent intent.

The Act passed in the forty-seventh year of Her Majesty's reign, chaptered thirty-seven and intitled "An Act to prevent fraud in the manufacture and sale of agricultural fertilizers," is by this Act repealed, except in regard to any offence committed against it or any prosecution or other act commenced and not concluded or completed, and any payment of money due in respect of any provision thereof.

A copy of the Act may be obtained upon application to the Department of Inland Revenue.

E. MIAL,

Commissioner.



Tenders for a License to Cut Timber on Dominion Lands in the Province of British Columbia.

SEALED TENDERS addressed to the undersigned and marked "Tender for a Timber Berth," will be received at this Office until noon on Monday, the 1st day of November next, for four timber berths of ten square miles each, more or less, numbered respectively 4, 5, 8 and 9, situated on Kicking Horse River and Ottertail Creek, a tributary of the Kicking Horse River, near Field and Ottertail Stations, on the line of the Canadian Pacific Railway, in the Province of British Columbia.

Sketches showing the position approximately of these berths, together with the conditions on which they will be licensed, may be obtained at this Department or at the Crown Timber Offices, Winnipeg, Calgary, N.W.T., and New Westminster, British Columbia.

A. M. BURGESS,

Deputy of the
Minister of the Interior.

Department of the Interior,
Ottawa, 14th August, 1886.



Tenders for a License to Cut Timber on Dominion Lands in the Province of British Columbia.

SEALED TENDERS addressed to the undersigned and marked "Tender for a Timber Berth," will be received at this Office up to noon on Wednesday, the 1st day of December next for three timber berths of fifty square miles each, more or less, numbered respectively 16, 17 and 18, situated on the west side of the Columbia River, near Golden City Station, on the line of the Canadian Pacific Railway, in the Province of British Columbia.

Sketches showing the position approximately of these berths, together with the conditions upon which they will be licensed, and the forms of tender therefor, may be obtained at this Department or at the Crown Timber Offices at Winnipeg, Calgary, N.W.T., and New Westminster, British Columbia.

A. M. BURGESS,

Deputy of the
Minister of the Interior.

Department of the Interior,
Ottawa, 9th September, 1886.

MINES AND MINERALS.

Developed and Undeveloped Mines and Minerals of Commercial Value BOUGHT AND SOLD.

Properties examined and analyses made of ore of every description. A competent Expert is permanently engaged for the purpose of making Unprejudiced Reports on all Mines placed in our hands for Sale, such reports being at all times open to intending purchasers for examination.

Phosphate, Iron, Iron Pyrites, Copper, Asbestos, Mica, Plumbago, Gold and Silver Mines, and Marble and Sandstone Quarries, for Sale.

Mineral Lands examined and reported on by our expert; also, analyses of Minerals of every description made by a COMPETENT ASSAYIST.

Correspondence with Owners of Mines and Capitalists desirous of investing is most respectfully solicited.

Address all Communications to

E. G. POWELL,

14 Metcalfe Street, Union Chambers, Ottawa, Canada.

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Vol. V.—No. 1.

Rock Drills, Air Compressors,



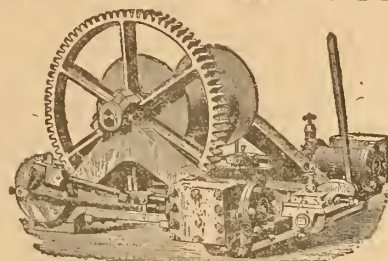
General Mining Machinery,
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Miller Bros. & Mitchell,



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ECLIPSE MINING POWDER

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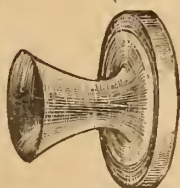
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Nov. 22nd, 1886.



NOTICE RESPECTING PASSPORTS.

PERSONS requiring passports from the Canadian Government should make application to this Department for the same, such application to be accompanied by the sum of four dollars, in payment of the official fee upon passports as fixed by the Governor-in-Council.

G. POWELL,
Under Secretary of State.
OTTAWA, 19th Feb., 1886.



Department of Inland Revenue.

An Act respecting Agricultural Fertilizers.

The public is hereby notified that the provisions of the Act respecting AGRICULTURAL FERTILIZERS came into force on the 1st of January, 1886 and that all Fertilizers sold thereafter require to be sold subject to the conditions and restrictions therein contained—the main features of which are as follows:

The expression "fertilizer" means and includes all fertilizers which are sold at more than TEN DOLLARS per ton, and which contains ammonia, or its equivalent of nitrogen, or phosphoric acid.

Every manufacturer or importer of fertilizers for sale, shall, in the course of the month of January in each year, and before offering the same fertilizer for sale, transmit to the Minister of Inland Revenue, carriage paid, a sealed glass jar, containing at least two pounds of the fertilizer manufactured or imported by him, with the certificate of analysis of the same, together with an affidavit setting forth that each jar contains a fair average sample of the fertilizer manufactured or imported by him; and such sample shall be preserved by the Minister of Inland Revenue for the purpose of comparison with any sample of fertilizer which is obtained in the course of the twelve months then next ensuing from such manufacturer or importer, and which is transmitted to the chief analyst for analysis.

If the fertilizer is put up in packages, every such package intended for sale or distribution within Canada shall have the manufacturer's certificate of analysis placed upon or securely attached to each package by the manufacturer; if the fertilizer is in bags it shall be distinctly stamped or printed upon each bag; if it is in barrels, it shall be either branded, stamped or printed upon the head of each barrel or distinctly printed upon good paper and securely pasted upon the head of each barrel, or upon a tag securely attached to the head of each barrel; if it is in bulk, the manufacturer's certificate shall be produced and a copy given to each purchaser.

No fertilizer shall be sold or offered or exposed for sale unless a certificate of

analysis and sample of the same shall have been transmitted to the Minister of Inland Revenue and the provisions of the foregoing sub-section have been complied with.

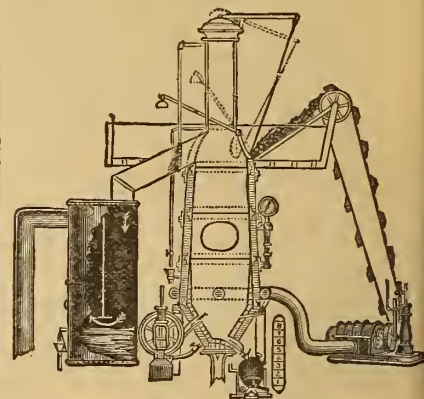
Every person who sells or offers or exposes for sale any fertilizer, in respect of which the provisions of this Act have not been complied with—or who permits a certificate of analysis to be attached to any package, bag or barrel of such fertilizer, or to be produced to the inspector, to accompany the bill of inspection of such inspector stating that the fertilizer contains a larger percentage of the constituents mentioned in sub-section No. 11 of the Act than is contained therein—or who sells, offers or exposes for sale any fertilizer purporting to have been inspected, and which does not contain the percentage of constituents mentioned in the next preceding section—or who sells or offers or exposes for sale any fertilizer which does not contain the percentage of constituents mentioned in the manufacturer's certificate accompanying the same, shall be liable in each case to a penalty not exceeding fifty dollars for the first offence, and for each subsequent offence to a penalty not exceeding one hundred dollars. Provided always that deficiency of one per centum of the ammonia, or its equivalent of nitrogen, or of the phosphoric acid, claimed to be contained shall not be considered as evidence of fraudulent intent.

The Act passed in the forty-seventh year of Her Majesty's reign, chaptered thirty-seven and entitled, "*An Act to prevent fraud in the manufacture and sale of agricultural fertilizers*," is by this Act repealed, except in regard to any offence committed against it or any prosecution or other act commenced and not concluded or completed, and any payment of money due in respect of any provision thereof.

A copy of the Act may be obtained upon application to the Department of Inland Revenue.

E. MIALL,
Commissioner.

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The CANADIAN MINING REVIEW, is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts, as well as others interested in Canadian Mineral Lands, are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 20th of the month.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

Advertising Space.

The circulation of the CANADIAN MINING REVIEW, which has steadily been going up since its first publication, more than five years ago, has now more than doubled the estimate upon which we had reckoned, and its value as an advertising medium to business men who wish to reach the best classes of mine owners and operators, and the mining centres and camps of every province in the Dominion, is consequently very greatly enhanced. The REVIEW is in the widest sense a Canadian journal belonging to all provinces alike; it is the only journal published in Canada wholly devoted to the interests of her mining industries and mineral resources. We would simply draw the attention of those who have hitherto overlooked it, to this matter, promising our best attention and most reasonable terms on any application for advertising space.

TIMBER AND MINES

Of the Provinces of Quebec and Ontario as a Means of Producing Revenue.

John Stewart, Ottawa.

The timber area of these provinces is being lessened each year by fire and the axe to an extent beyond that which it is yearly increased by the renewing of the capital stock by the natural growth of the forest. The timber is considered such a permanent means of revenue that in selling lots of land certain reserves of timber are made by the local authorities, and the settler or farmer is not trusted as a fit and proper custodian of this source of the country's wealth. Timber lots are, however, sold to lumbermen or speculators out of the area included in a timber limit; he, therefore, is considered a proper person to hold the timber

reserves of the Province for his future use, and possibly to control the price of lumber or prevent it falling into the hands of a competitor in the same line. The timber area so held is very large, amounting to millions of acres of the best timber lands in these Provinces. The yearly decreasing supply of timber is accompanied by an almost yearly increase in value, not to the revenue and capital account of the Province, but to the fortunate owners of the lots so purchased. As a result of the custom of selling lots with timber, any increase in value of the capital or reserve stock on hand goes to the benefit of the holder of it on speculation; whereas, that benefit would go to the Province, if not sold, but was retained for lease as it ought to be.

Mining lands are sold at prices ranging up to \$2.00 per acre, in Ontario, and up to \$2.50* per acre, in Quebec, and no reserves of minerals are made, excepting for gold in Quebec. This industry is not considered of sufficient value to be held as a means of revenue. In consequence of the system of selling minerals along with the soil, the farmer or speculator in mining lands becomes the person who holds this source of national wealth and revenue; whereas, the mining right and mining lands ought to be held for the use of the miner by the Provincial authorities. A glance at the manner in which mining lands are secured will show the want of system, and the injustice done to explorers and prospectors, where a party under the present system, now in force, makes application at the Department of Crown Lands for a larger or smaller area of mining lands, and no notice of such grant, or location, its area, or time of option, or period of exploration, is made, either on the ground or in the Local Land Office, or in the local newspapers of the district in which the location is made. A party, or speculator, applies for the unoccupied lands in half a township, or a whole township, or possibly more; he may make a money deposit or not, according to the influence he possesses, with the "powers that be." He may explore the lands or not, it is not compulsory for him to make a report of such exploration; nor does the Land office acquire any information of the nature of the part not accepted from the option so granted. There being no law, regulating his actions, he may do just as he pleases in the matter. Sundry explorers and prospectors, as A, B and C are at work in this district, in which the option has been granted, and are of course ignorant of its existence, and prosecute the search for the hidden treasures they are in quest of, quite ignorant of the sad fact that the Government under the present (to them dishonest) system will only rob them of any discovery they may make. Having made a discovery, or find of minerals, A, B or C, makes application for one or more lots, and receives a reply to the effect that the lots in question have been applied for by Mr. Speculator! Mr. Speculator is also notified, and either accepts

the lot or lots, on the exploration or reputation of A, B or C, if it is good, or sends quietly to have it looked at, and if good, resolves to take it, and as A, B, C are not entitled to make their own location on the ground, as it ought to be, consequently there appears no irregularity in the manner in which the transaction is completed, in favour of Mr. Speculator, who has stolen the discovery. A, B or C, the actual discoverer, or the person entitled to it, has no redress, unless he shares his claim with an influential political friend or two who will champion and fight his cause.

Is this a just and fair system to the mining section of the population? Is it a wise system that scatters the capital or revenue earning resources of the Province, and disposes of them at the price of, and along with the soil, to the wrong owner?

On the one hand the Province offers inducements to immigration, and under a wrong system of laws renders the Province an unfit place for the location of a mining population, as the laws now in force do not encourage exploration and deprive the worthy discoverer of minerals of the just reward of his labour.

In discussing the desirability or not of Government control of certain matters, some do not discriminate or appreciate the difference between cases which are not parallel. In one case, there is an ownership or proprietary, by the state, for the general good, of an article which is tangible and real, such as land, minerals or money, and mail matter; in these cases there is an ownership or responsibility on the part of the State, as these things constitute matters of national magnitude and importance, and prevent monopoly and frauds under proper regulations, thus giving better public satisfaction and confidence than when in private hands. In the instance of others, which are purely matters of trade, with no vested interests in that which is tangible, and no ownership, trust or charge is placed with the Government, but merely a trade, or business conducted, and has no material existence is liable to change of value or subject to inflation in price, and that cannot be manufactured or made, having no reality other than mere sentiment, or the product of the brain of man, as in the case when the state controls the schools and religion; these two, had best be left in private hands to permit of the full development of the individual capacity and competition, producing the survival of the fittest, or that conducted under true principles of right and truth. The condition of Mexico is an instance of the above line of argument. The Government of that country controls the mining industry and owns all minerals, and mining has consequently prospered and been the chief means of revenue.

With forests fast decreasing in area, and mining resources ruined or undeveloped, and the system goes on as at present, from what source in the future is the Provincial Revenue to be derived?

The large extent of mining territory of known, and in part some of it yet unknown value, that these Provinces still hold, intersected as it is by lines of railway, and the benefit of it to be derived from the active development of that wealth to the country at large, but more especially to the settlements in and around the various mining locations, renders the enactment of a better system of mining laws and inspection a necessity which cannot longer be delayed.

[*By an amendment passed by the Lieutenant Governor in Council, 10th December, 1885, it is ordered under the provisions of section 124, of the Act 43-44 Vict., Chap. 12, (Quebec General Mining Act of 1880), that in all future sales of lots of land in the Province of Quebec, for mining purposes, the following prices be exacted:—

For phosphate lands, five dollars (\$5) per acre, as at present.

For iron and ochre, two dollars (\$2) per acre.

For all other mining lands including gold, silver, asbestos, lead, mica, graphite, plumbago, copper and generally all mines other than iron and ochre, five dollars (\$5) per acre.]—Editor.

PHOSPHATE.

The Latest Quotations.

MINERAL PHOSPHATES—Some transactions have already taken place in Canadian at about last year's prices, but Raisers are not prepared to do further business at present without an advance for the best qualities. Ground Canadian is also enquired for, but sellers are indisposed to contract until the season for shipment draws nearer. South Carolina Phosphates.—There is no new phase to report; a large contract from a new deposit of land has been made at 8d. for delivery to a safe port in U. K., and sundry ballast parcels have realized from 7½d. to 8d. according to port of discharge. The new Somme Phosphate continues to turn out satisfactorily, and is being eagerly sought after by both Home and Continental Manufacturers to such a degree that we have had to decline any but small trial orders for prompt shipment. Belgian.—A large contract in low class material has been made to close a liquidation account, otherwise the business transacted has been at late prices, which still remain temptingly cheap for this useful material. A new make of 45 to 50 per cent. and 50 to 55 per cent. both with a guaranteed maximum of 2 per cent. Iron and Alumina, is being offered which may supersede the old ferruginous quality. Cambridge and Bedford Coprolites are unchanged, and quoted at 43s. f.o.r., or Ground at 50s. in Buyer's bags, or 52s. in lent bags, f.o.r., the latter at 26s., f.o.r., or 31s. 6d., f.o.b., Thames.

Township of Loughboro'.

Mr. J. Sloan, of Perth, is prospecting on the Purdy Bros. lots. Operations will be begun as soon as the snow is off the ground.

Satisfactory reports have been received from Messrs. Smith & Lacey's deposit in the same township.

During the present existing depression in the phosphate market but a few hands are employed at the Foxton property, in the Township of Loughboro'. The present depth of the shaft is about 70 feet, and drifting is being pursued in a north-easterly direction from the bottom on a capital vein of pure ore. The indications are most encouraging.

Buckingham District.

The Du Lievre Company are making improvements at the basin below Buckingham. They anticipate a brisk business in the spring.

The construction of the new tram line at the Little Rapids mine is nearing completion. This line, which is already graded, runs from the workings on the summit of the hill to the wharf at the river side. The transportation of the ore by this means will be accomplished in a couple of month's time.

The output from this property during the past month was about 115 tons of high grade ore. Mr. George Smith, the superintendent of the mine, states that he can mine ore in pit No. 2, for a considerable less price than from the bottom of the shaft where last month's product was raised. He says that with 50 to 70 men he can lay the ore at the river's bank for about \$5.00 per ton and not work off vein II.

The property is now thoroughly equipped with first class plant of the most modern and approved pattern, and the quality of the ore is of a very high grade. "Dr T. Sterry Hunt has said that from present appearances, in my opinion, no property on the Lievre offers better or surer prospects for extensive and remunerative operations than does this mine."

South Carolina.

2,775 men were employed last year in mining phosphate in South Carolina.

MINING NOTES.

Nova Scotia.

The yield of gold at the Oxford mines for the month of February was 341 ozs. from 78 tons.

The annual meeting of the stockholders of the Acadian Coal Company will take place at New York, on Wednesday, 23rd instant.

Work has been resumed in the 100 feet shaft at the Cowan Gold Mining Company property, Yarmouth Co. A milling of about 10,000 lbs. of dirt taken from the new discovery is reported to have given about 3 ozs. of gold.

The shares of the Georges River Mining and Manufacturing Company, a West Virginia corporation which holds a Government lease of one square mile of mining area at Georges River, near North Sydney, Cape Breton, are at present on the New York market. The veins that have been discovered on the property are:—First, vein of grey magnetic iron 20 feet wide at surface. Second, vein of silver and other metals 20 feet wide and carrying ten ounces of silver at surface. Third, vein of iron pyrites, copper and other metals, samples of which taken from cut about 15 feet deep, carry about 10 per cent. of copper, besides other minerals, and strong indications of silver and gold.

The strike of the Pictou coal miners which, it was reported, had been settled, unfortunately still continues, and Halifax is at present suffering from a coal famine that is particularly hard on the poor, who have been unable to lay in enough coal to last through the spring. We have not examined into the cause of the strike, and so are unable to pronounce upon its merits, but, for the sake of the Halifax poor, we hope that it may be brought to a speedy termination. Cargoes of coal are now being received from Baltimore. Dealers in Sydney coal have evidently been taken by surprise, and will hardly let another season go over without greatly increasing their winter supply. The completion of the railroad to Sydney will put an end to all possibility of our coal merchants being caught in this way again.—*Critic*.

At the North Brookfield mine, Queen's County, the work of development is being vigorously pursued. Four shafts have been sunk, one to the depth of 80 feet, and cross levels have been run for at least 300 feet.

Reduced rates for transportation over the Inter-Colonial are wanted by the iron miners in this province. At present the cost of transportation from Nova Scotia to Ontario is about equal to the cost from England to the same market; so that the protection given by the National Policy to Nova Scotia iron mines is lessened by the extra cost of transportation from the mines to the market.

New Brunswick.

The gold mining areas at Eagle Lake, Salmon River, owned and operated by Messrs. Hattie & Ross, have been bonded to English capitalists.

Quebec.

The annual meeting of shareholders of the Intercolonial Coal Mining Company was held at Montreal on Wednesday, 2nd March. The following were elected directors of the company for the ensuing year:—Messrs. Gilbert Scott, H. A. Budden, James P. Cleghorn, Robert Anderson, Alexander Gunn, Peter Redpath, W. M. Ramsay, Henry J. Tiffin and H. S. Macdougall. At a subsequent meeting of the board Messrs. Gilbert Scott and H. A. Budden were re-elected president and vice-president, respectively, and Mr. W. J. Nelson was re-appointed secretary-treasurer of the company.

Ontario.

The annual general meeting of the British and Canadian Mica and Mining Company (Limited), was held in their offices at Ottawa on the 17th ult. The following gentlemen were elected office-bearers for the ensuing year:—President, B. A. Buxton, Esq., of London, England; Vice-President, C. W. Spencer, Esq., Montreal; Secretary-Treasurer, W. A. Allan, Esq., Ottawa.

The various reports presented showed that the property was in a most flourishing condition, and that the output of mica from the mine and the demand for it, both in Canada and in the United States, during the past season, had been eminently satisfactory. The demand for the product had more than trebled since the last meeting of the company.

Increased facilities, including new steam power for the breaking up of the ground, have been added to the property, and among other machinery a couple of Ingersoll drills, worked by compressed air, are kept constantly in opera-

tion. The quality of the mica is Muscovite of pure transparency and lustre, and the quantity in sight is apparently unlimited.

There is no reason why this corporation should not become one of the best dividend paying concerns in Canada. At present the indications are most satisfactory. An old miner has given it as his opinion that the property is capable of producing more fine mica than all the mica mines of North Carolina. From what we have seen of the property we can heartily endorse his opinion.

PORT ARTHUR DISTRICT.

Sixty men are at present employed at the Silver Mountain Mine.

A thirty stamp mill will shortly be placed in operation at the Beaver Mine. This will virtually double the mills.

Machinery is to be put in at the Malaga mine as soon as the spring opens. About ten men are presently at work.

Mr. T. A. Keefer has received instructions to commence work on both the Huronian and Huron Bay gold mines. Operations will be resumed at once.

The capital stock of the Shuniah Weachn Mine Company, which has recently been organized in London, to develop the Silver Mountain Mine, is placed at £100,000, shares £1 each. The vendors receive 25,000 shares and £30,000; 9,000 fully paid up shares is to be allotted to directors in lieu of remuneration for two years. The property which is situated about 10 miles west from Port Arthur is 240 acres in extent.

The *Miner* reports that the Rabbit Mountain Mining Company has given instructions for the erection of a smelting plant for the purpose of reducing their ore into silver bricks. No more concentrates or ore will be shipped out of the district from this mine, and it is one of the best signs of substantial progress chronicled for many a day. At the last meeting of the board of directors of this company the sum of \$20,000 was set apart to continue the work of developing the mine.

Judge Ingraham, of the Superior Court, New York, has given judgment in the action against the Silver Islet Consolidated Mining Company, brought at the instance of Theodore C. Weeks, Boston. From his decision it appears that the circumstances under which the stock of the company was issued in this case was a ingenious device for the purpose of evading the provisions of the Act. After reviewing at length the nature of the case and discussing the question of the assessments and forfeitures, the judge said: "On the whole case I think that the plaintiff is entitled to judgment; that on payment of the amount due on the assessment within thirty days after the entry of judgment, with interest from the date when the assessments respectively became due, the plaintiff shall be relieved from the forfeiture."

LAKE OF THE WOODS DISTRICT.

Messrs. Dobier & Co., of the Pine Portage Mine, will resume operations on their property shortly. Some difficulty has been experienced as to the most economical method for the

treatment of their ore, but it is expected that a steel furnace will obviate the difficulty. The ore though refractory is said to be rich.

The Gold Hill Mining Company expect to commence work at an early date. With the exception of some surface prospecting work and the sinking of some forty feet of a prospecting shaft but little work has been done so far on the claims.

North-West Territories.

Coal is reported to have been found within easy distance of Battleford.

At a recent meeting of the directors of the Canadian Anthracite Coal Company, held at Ottawa, the general manager reported that operations are now being conducted on seam No. 6, which was found to be five feet three inches thick. The deposit in this seam is found to be much harder and superior to the others so far operated on. One hundred men are in camp and ninety-three of these are on the regular pay roll of the company.

British Columbia.

During the year 1886 twenty accidents to persons employed in or about the collieries have been reported. Of these three were fatal.

The output of coal from 1874 to 1886 has been as follows:—1874, 81,000; 1875, 110,000; 1876, 139,000; 1877, 154,000; 1878, 171,000; 1879, 241,000; 1880, 268,000; 1881, 228,000; 1882, 282,000; 1883, 213,000; 1884, 391,070; 1885, 365,000; 1886, 326,636.

The Burns Mountain Quartz Mining Company have, during the greater portion of last season, had men at work running drives in search of the main lode on their property in Cariboo. Over eight hundred feet has been driven and the indications are considered good.

The value of gold exported by the banks of Victoria during 1886 is placed at \$750,043. This shows a bank export of nearly \$160,000 in excess of 1885, and adding one-fifth as the estimated value of gold leaving the province otherwise than through the Victoria banks, gives a total yield of over \$903,000 for the past year—a very substantial and gratifying increase.

The following gentlemen have been elected office-bearers of the British Columbia Milling and Mining Company for the ensuing year:—Directors: Hon. J. H. Gray, J. Earle, F. S. Barnard, C. E. Redfern, J. Heywood, J. Irving, and J. Grant. W. J. Heywood was elected president, W. C. E. Redfern, treasurer, and Mr. G. A. Sargison, secretary. The auditor of the corporation is Mr. G. A. Sargison.

Cunningham Creek, where the ubiquitous Chinese made a lucky strike during the summer, and a company of four men has been taking out from \$20 to \$50 a day to the man, is said to be, on investigation, a discovery of no great importance. The location being on a point across which the old bed of the creek passed at a much higher level than the present bed of the stream.

The remarkably dry season together with a further decrease of the population in the Cariboo district has had the effect of further diminishing the annual yield of gold. Mr. Bowron states that the product of the past year is per-

haps not less than in 1885, in proportion to the number engaged and the time consumed in working, as for a considerable portion of the year quite a number of white men have been engaged upon quartz ledges which are, as yet, non-productive; besides, not a few miners left the district in the spring for the Granite Creek mines.

The Forest Rose Company of Cariboo, which yielded largely as a drifting claim in years gone by, and which has been at great expense for the past six or seven, in opening up so as to work as a hydraulic claim has at last reached bed-rock with their cut, and during the past season have been rewarded with good pay. The commission think that this claim will yield good returns for the next fifteen or twenty years as the extent of their ground is large.

Mr. Bowron, Gold Commissioner for the province, in his report to the Minister of Mines, estimates the gold yield for the district of Cariboo for the past year as follows:—

Barkerville Polling Division.....	\$96,000
Lightning.....	54,800
Quesnelle Mouth.....	45,800
Keithley Creek.....	62,000
Amount from time of collecting statistics to December 31st.....	15,000
Amount of which no account was obtainable.....	15,000
Total.....	\$288,300

Mr. J. L. Crimp, in his annual report, gives the following particulars of the work done during the past year:—"There have been fewer white miners in the district this year than last, but more Chinese; and it is chiefly owing to them that the increase in the yield of gold has taken place, and if it had not been for the continued rains during the month of September, the increase would have been considerably larger. During that month the several creeks were very high, and in consequence carried away many of their wing-dams, thereby causing a severe loss to them. Although these creeks have been worked over—some portions of them two or three times—the Chinese, by their excellent management and industry, are enabled to take out small wages. On Dease Creek, the increase was the largest. More Chinese were on that creek than any of the others, and most of them worked in the bed of the stream. All of the white men on the same creek have been working in the hills, and some of them have done very well; and the same may be said of the other creeks, for the beds of those streams having been worked over so many times, there is no inducement for the white miners to open claims in the old worked out creeks.

"The yield for this past season, as far as I can ascertain, is as follows:—

Laketon Division.....	\$41,460
McDame Division.....	22,150
Total.....	\$63,610

"There has been but little prospecting done in this district the past summer. There has been four white men prospecting on Mosquito Creek the past year, and although they have found very encouraging prospects, they have not found gold in sufficient quantities to pay; but are still in great hopes of striking good pay when they reach more favourable bed-rock, for the rock is so hard and smooth where they are working that it is impossible for gold to lodge. There were also three white men, Messrs. Hil-

ton, Sainsbury and Beedy, prospecting on the Muddy River, a large stream to the east from the present mining district, situated about ninety miles east of Sylvester's Landing. The stream is a large one, running through a very wide valley, and emptying into the Laird River, about eighty miles below Mr. Sylvester's trading post. Mr. Hilton informs me that if it had not been for the high state of the river, he thought they would have done very well. In consequence of the high water most of the bars were covered; but wherever they found bars, at the head of them they prospected very well. On one occasion, two of them rocked out \$100 in one day; and on another, one man rocked out \$140 in seven days. The character of the gold is fine, and has to be saved with quicksilver. In 1874, there were eight men on the same river, some distance above, where the mountains come much closer together, and I have been informed by one of the parties a few days ago, that they found coarse gold, which he thought would pay five dollars per day; but at that time wages were eight dollars per day on Dease Creek, so they concluded that it would not justify them to remain there. He tells me, also, that he thinks the distance from Dease Lake to where they got these prospects is from 90 to 100 miles, in an easterly direction from Dease Lake. Taking into consideration the excellent prospects found on the bars, of fine gold, it leads to the conclusion that its source is in the mountains. I would strongly recommend that the Government make a small appropriation to assist, say three or four men to get an outfit next summer to proceed there and prospect this stream, or creeks emptying into it, for unless some new discoveries are made, this district will be soon reduced to a very small number of miners. The number of men wintering in the mining portion of the district is 29 white men and about 70 Chinamen. The health of the miners during the past season has been generally good, and good order has prevailed all over the district."

United States.

Mr. James M. Swank, Secretary of the American Iron and Steel Association, estimates the consumption of pig iron in the United States for the past twelve years as follows:—

Year.	Gross Ton.	Year.	Gross Tons.
1874	2,500,000	1881	4,982,565
1875	2,000,000	1882	4,963,278
1876	1,900,000	1883	4,834,740
1877	2,150,000	1884	4,229,280
1878	2,500,000	1885	4,348,844
1879	3,432,534	1886	6,208,656
1880	3,990,405		

If we may judge from the old fashioned method of bringing round asphyxiated miners in the early days of English coal mining, Choke damp must have been a source of sore trouble to the miners, for the remedy, we are told, "was to dig a hole in the earth and lay them on their bellies with their mouths in it; if that failed they turned them full of good ale; but if that failed the case was concluded desperate indeed."

CALIFORNIA.

The product of the Plymouth Consolidated Gold Mining Company during the year 1886 was as follows:—January, 55,683.47; February, 45,611.11; March, 53,897.81; April, 50,778.91; May, 49,502.13; June, 44,166.43; July, 44,566.75; August, 51,528.16; September, 51,812.36; October, 56,513.95; November,

61,449.52; December, 61,467.80. Total, \$670,059.85. The average monthly product was \$54,555.92½. This is said to be the best gold mine in America, it is fully developed with large reserves, and is now paying larger dividends than any other similar property in North America. The stock is selling at about \$1,650,000. The company is said to possess the largest quartz mill in the world, with a single exception. From the printed report just published, it is stated that a piece of rock one foot square and one mile in length represents the amount crushed by the Plymouth mills every 24 hours.

The bill appropriating \$30,000 for a State Mining Bureau has been finally passed by a vote of 32 to 5.

Great Britain.

THE SCOTCH MINERS' STRIKE.

Recent English exchanges report a great labour demonstration, held at Edinburgh, at which it is computed about 10,000 persons were present. The main object of the gathering was to express sympathy with the miners of Scotland in their existing position; and resolutions were adopted calling for the nationalisation of land, mines, machinery, and all means of production for the common good. In order fully to appreciate the meaning of these resolutions, it is to be borne in mind that in Scotland alone there are between 60,000 and 70,000 miners, of whom about 30,000 are located in Lanarkshire, the remainder hailing principally from Ayrshire, Fifeshire, and the Lothians. In Lanarkshire the men have returned to their work discontented, and in Ayrshire the 7000 miners on strike have been recommended to go back to the pit "in the meantime," and pending the result of the forthcoming Conference. It is more than hinted—and the tone of the speakers bore out the inference—that should that Conference fail a national strike will ensue. In the west country wages have fallen as low as 3s. per day, while in the east the rate varies from 3s. 9d. to 3s. 11d. for eleven days' work in the fortnight. But from these sums have to be deducted, on an average, about 2s. a week for pick-sharpening, powder, oil, medical officer, &c., with the result that the West wages average 12s. 9d., and in the Lothians about 18s. weekly. It was pointed out, that a miner, while he got only 4½d. or 6d. for raising a ton of coal, paid 6s. to his master for it at the pit-mouth if he wanted to give warmth to his family; that the fines and charges imposed upon him in a day were often more than the total amount of his earnings; and that the net result of all this was starvation to the men and unlimited wealth to the masters, who, in many cases, spent their ill-gotten gains abroad in gambling, or at home in luxury. "In fact," said one speaker from the West, "unless the miners have their grievances redressed they are determined to make a desperate movement which will shake Scotland from one end to the other."

During the year 1886, 116 persons lost their lives from mining explosions in England and Wales. Since the Mines Regulation Act came into operation in 1873, there has been a marked diminution in the number of lives lost owing to explosions.

On 1st March there were 377 furnaces working and 506 idle throughout the United Kingdom.

The Canadian Anthracite Coal Co.

LIMITED.

Miners & Shippers of Coal.

McLEOD STEWART, Pres., J. G. THROP, Vice-Prest.
OTTAWA, CANADA. EAU CLAIRE, WIS.
A. PUGH, General Manager, W. B. SCARTH, Secretary,
St. PAUL, MINN. WINNIPEG, MAN.
O. H. INGRAM, Treasurer,
EAU CLAIRE, WIS.

Mines at Anthracite,

N. W. T., CANADA. V-I—1Y

COAL MINING.

Report of the Minister of Mines of British Columbia.

The Government Inspector's Interesting Figures—
Work Done During 1886 at the Various
Collieries.—Most Encouraging Prospects.

The report for 1886 of the Hon. John Robson, Minister of Mines in British Columbia, is just to hand. It is a capital resumé of the work done at the various mines, and is replete with valuable statistics and other information. The following is an excerpt taken from the report of Mr. Archibald Dick, the Government Inspector of Mines:

NANAIMO, B. C.,

1st February, 1887.

"SIR,—I have the honour to lay before you my report as Inspector of Mines, for the year ending 31st December, 1886, as required by the 'Coal Mines Regulation Act, 1877.'

"The collieries operated in the year 1886, are the following:—

"Nanaimo Colliery, of the Vancouver Coal Mining and Land Company, Limited.

"Wellington Colliery, belonging to Messrs. Robert Dunsmuir & Sons.

"East Wellington Colliery, owned by R. D. Chandler, Esq., of San Francisco.

"There has not been any work done at the Alexandria Colliery, which was started in 1884, in Cranberry District, by the Esquimalt and Nanaimo Railway Company.

"The output of coal for the year 1886 amounted to 326,636 tons, as follows:—

Nanaimo Colliery.....112,761 tons.
Wellington Colliery.....185,846 "
East Wellington Colliery.... 28,029 "

Total output in 1886.....326,636 "
Add coal in stock 1st January,
1886.....25,653 "

Total coal for disposal
in 1886.....352,289 "

The exports of coal for the year 1886 amounted to 249,205 tons, as follows:—

Nanaimo Colliery.....79,637 tons.
Wellington Colliery.....144,526 "
East Wellington Colliery.... 25,042 "

Total exports for 1886..249,205 "

"This quarter of a million tons of coal was shipped principally to California, but shipments were also made to Portland, Oregon; Alaska, Petropavloski, Mexico, and the Hawaiian Islands; besides which, coal for fuel has been regularly supplied to the ocean mail steamers, gunboats, and vessels calling.

"In order to arrive at the total amount of sales for the year, the sales of coal for use in this Province must be added to the tonnage of the exports; but as these local sales are included

in the returns of coal under the heading of 'home consumption,' aggregating \$5,787 tons, which comprises the coal consumed in the colliery furnaces (excepting in the East Wellington return), I can only refer you to the returns.

"The following comparison of the aggregate output and export of coal for the years 1884, 1885, and 1886, will give at a glance an idea of the fluctuating character of our coal operations:—

	Output.	Export.
1884.....	394,070 tons.	306,478 tons.
1885.....	365,596 " "	237,797 " "
1886.....	326,636 " "	249,205 " "

"From the above it will be seen that the output of 1886 is below that of 1884, and 1885, considerably below the former; and, also, that the exports of 1886, while exceeding that of 1885, is far less than that of 1884.

"The year 1884 was one of unprecedented prosperity in our coal industry, both in volume of trade and prices realized; but the drooping figures of the succeeding years, with the lower rates which our collieries have had to submit to in return for their product, urge me to again bring before your attention the necessity for the adoption of some active measures for the relief of our collieries from the imposition of 75 cents per ton levied in the United States upon our coal when it enters their ports. With the removal of this inequitable tax by a judicious reciprocity treaty, our coal industry will at once recover itself, and years unexampled in activity and progress will become our happy lot. We begin the year 1887 with 25,653 tons of coal 'stock in hand' at the collieries.

"The following statement shows the position of British Columbia in the chief market for the produce of our mines for the past four years, and according to the outlook the position of our Province as an exporter to California will be fully maintained during the year 1887:—

	1883. Tons.	1884. Tons.	1885. Tons.	1886. Tons.
British Columbia.....	128,503	291,546	224,298	253,89*
Australia.....	174,143	190,497	206,751	247,293
England and Wales.....	131,355	168,808	170,656	160,869
Scotland.....	21,942	21,143	20,228	19,795
Eastern States (Anthra- cite, &c.).....	43,861	38,124	29,834	19,517
Seattle.....	139,600	125,000	75,112	57,552
Carbon Hill.....	149,135	122,069	157,241	124,527
Green River and Mount Diablo.....	76,162	77,485	71,615	90,664
Renton, Newport and South Prairie.....	43,600	60,413	67,604	73,674
	899,301	1,355,076	1,023,339	1,087,697

"It will be seen that the importations of the State of California in 1886, were larger than for any previous year; the market there for coal is steadily increasing in capacity for absorbing our product, which is a most encouraging feature in our future prospects.

"Our collieries are equal to the supply of coal of first-class quality for steam, gas, or household purposes, sufficient in quantity to meet the requirements of all markets at present within our reach; with harbour accommodation, wharves, and dispatch in loading, second to none.

"We are looking also to the establishment of the great ocean mail service between this Province and Australia, China and Japan, as introducing an additional customer for our superior coal, and I trust our expectation in this respect will soon be realized.

NANAIMO COLLIERY.

"This colliery, as has been the case with all

the other collieries in this district, has not been worked very steadily during the past year, on account of the dullness in the coal market.

"The Douglas Pit and the New Douglas or Chase River Mine, have 'stopped working,' and the machinery, rails, and dumps are all taken out. These mines are now filling, or are full of water.

"No. 1 Pit, Esplanade, Nanaimo.

"This is a mine mentioned in a previous report, and belonging to the Vancouver Coal Mining and Land Company (Limited). Everything about this mine, both on the surface and underground, is done in the strongest and most workmanlike manner. The workings about the bottom of this shaft having been already reported upon by me, I need not again describe them.

"The level on the south side of the shaft is yet standing idle.

"The level on the other side, known as the North No. 1 Level, has not been working steadily during the past year, except when it was necessary to make repairs. The company have had great difficulties to contend with in this level, in the shape of faults and wants in the coal, yet they persevered until they have got this level at the face over 1,500 yards in from the shaft, and under the water of the harbour nearly all the way. They have not yet got good coal in the face of the level, as they are trying to get through a fault; but the stalls, in a few yards after they leave the level, get over the fault and get into good coal, where the company have now got quite a large piece of it opened out, which proves to be very good and hard, varying in thickness from 6 to 10 feet, so that once the level, or main gangway, gets clear of the faults and into the good coal they will soon be able to make a large opening, which will greatly increase the output of coal.

"There is also a slope in this mine (mentioned in a former report). This slope is now down over 1,000 yards, going direct under the water of Nanaimo Harbour, with about 850 feet of rock, etc., intervening, so that little or no water comes from the roof, and what does come is free from salt. In this slope, as in the No. 1 Level, there is much ground which will not be profitable to work, and at present the coal is not very thick at the face of the slope. In this slope have been three levels on each side; those on the north side are known as No. 2, 3, and 4, north levels, and from those levels the company take a large amount of coal daily; although there are many bad places, yet when the coal is good it is generally very thick, and turns out well. On the south side the levels are known as No. 2, 3, and 4, south levels. About 50 yards down the slope to the south side there branches off what is called the Diagonal Slope at an angle from the Main Slope of fifty-four degrees; this slope intersects with No. 2 and 3 levels. The engine at the top of the slope takes away the coal from these places, causing a great saving of labour in not running the coal to the main slope. The coal down here is very thick sometimes; at one time they could not tell how thick it was, as they could neither see top nor bottom; this slope is being pushed ahead, so, also, is the No. 4 Level, which is near to the bottom of the main slope, and eventually this level will intersect the Diagonal Slope, when the engine at the top will also take away the coal in place of running it out to the main slope by men or mules. As you will have observed there is very much ground that is not workable, yet the company are now sending out over 800 tons of coal per day, with prospects of improving.

"Ventilation is good; the motive power has

been a furnace in connection with a steam jet, and the engine at the top of the slope exhausting into the No. 2, or upcast shaft. When I was down on the 23rd December there were 45,000 cubic feet of air in circulation per minute for the use of 118 men and boys; here the ventilation is on the separate split system, the main division being from the slope, taking the levels on either side as the intake returning by the way of the stalls, and as the pure air gets to the lowest place first, it is gradually on the ascend after it leaves the slope.

"There is now very little gas seen in this mine, but sometimes the firemen come across a little of it, and the appearance of a little reminds them of the necessity of being very careful.

"You will have noticed that I stated that the motive power of the ventilation has been a furnace and steam jet, but now it is a suction fan of the largest size. This fan has been erected about 100 feet from the upcast shaft, where an excavation has been made to the depth of about 18 feet, and continuing the excavation from the fan to the upcast shaft with a down grade going to the shaft. This part of the airway has been heavily timbered and planked, and covered over with fine ashes, so that everything may be closely sealed. This fan has been put up at a great expense to the company, but they could see that it was what their extensive mine required, and they have got a machine which, I expect, will ever do the requirements of this mine. The diameter of the fan is 36 feet, and its width 12 feet; it is worked by an engine of 26-inch cylinder with 30-inch stroke; the engine, and nearly all the machinery in connection with the ponderous machine, came from England, and it is a relief to the company, and also to the manager, to know that they have got appliances to keep in motion all the air that will be required to dilute all noxious gases that this extensive mine is likely to give off. This fan is now a running machine. I know this, but have not tested it. The manager, Mr. W. McGregor, has, however, tried its power on different occasions, while running quite slow, and he never found less than 60,000 cubic feet per minute.

"Everything about the mine is kept in good order, and no expense is spared to make it safe (as far as can be seen); there is always plenty of timber and every other material on hand that is necessary. It is to be hoped that this valuable mine, after all the expense the company have been put to, will yet be a financial success, which will be good for the company, people of Nanaimo, and the Province in general.

"It will be interesting for me to add that in this mine, at the bottom of the No. 2 or air shaft, the company have been prospecting by putting down a bore-hole with diamond drilling machinery. Here they have been very successful, for at a depth of 70 feet below the bottom of the shaft, or 700 feet from the surface they struck coal, which this bore-hole proves to be 6 feet thick, good and hard; and on testing some of the coal that was got out of the hole as to its gas making qualities, it was found that it was equal to the Douglas coal. This bore is being continued and is now down 100 feet, and there are yet very encouraging prospects of finding another seam of coal. I have good authority to say that when this hole is stopped, at no distant date thereafter the company will start to sink the shaft and push it with all haste down to the coal or coals that may yet be got at, and it is to be hoped when they get their shaft down that the coal will exceed their expectations, both as regards quality and regu-

*These totals represent the quantity of coal actually received in San Francisco, and other ports in California, during the years indicated, not necessarily the quantities shipped to those ports in the years named.

larity. This is a valuable discovery to the city, and a place where a great many will be employed; it will also be beneficial to every person about the town and in the Province generally. Last, though not least, it may be a reward to the Vancouver Coal Company, which has been so liberal in furnishing the means to search for and find such hidden treasures.

"SOUTH FIELD MINE.

"This is also one of the Vancouver Coal Company's mines. During the past year this mine has been about at a stand, except so far as the keeping out of the water; but that is no fault of the mine; the officers of the company found they could supply the demand from their other mine. The mine stands to-day almost as it stood a year ago, when the miners brought their tools out, and when the market revives, which I hope will be soon, the company will be well prepared, as they will be able to start work with two days' notice and have an output of coal the first day.

"WELLINGTON COLLIERY,

"Belonging to Messrs. Robert Dunsmuir & Sons. The Wellington mine is the original of the Wellington Colliery; this mine has been in operation for about 16 or 17 years, and now it is getting nearly worked out, not on account of the coal being done, but owing to other mines cutting off all round.

"This has been a valuable property, and is yet. During the year that is past the work has been principally at the pillars (of coal) and other coal along the outcrop; all the lower levels are now finished and they are now working at the pillars in the upper levels, which will continue to give a good supply of coal for quite a long time yet. The coal that is being got out is of the best quality of the Wellington coal and similar to what was got out 12 or 14 years ago, this being the coal they went through and left to support the workings behind them.

"Ventilation is good; motive power, a large furnace, with two air shafts or outlets; gas is seldom or never seen here, except on some occasions, as when a large 'cave' takes place. The fireman examines all the mine, by night as well as by day, to see if any of the caves let off any gas, and that none collects, and to report to the workmen whether or not the mine is in a safe condition for them to proceed to work. In connection with this mine there is what is known as the Adit level, that is a level going out into the valley of the Millstone River; the coal being taken out that way. Here there has been considerable idle time, as the coal trade has not been in a condition to work it steadily; but here, as in all the other mines belonging to Messrs. Dunsmuir & Sons, they only work when there is a demand and means of taking away the coal.

"Ventilation is good. This part is partly ventilated by the Wellington mine and partly by an air shaft with a furnace. At either of the above mines I always saw plenty of timber and other things necessary for general use about the mines.

"No. 3 Pit, WELLINGTON COLLIERY.

"This is the only shaft worked in the valley of the Millstone by Messrs. Robert Dunsmuir & Sons, with the exception of the air shaft. This mine is worked by a slope, with the top of it near the bottom of the shaft, with the levels from either side. Here the coal is worked on the pillar and stall system, and as the workings are under the valley they leave large pillars to support the roof. In this mine there is a long stretch of coal in sight, and as good as any coal

that has ever been opened out in the Wellington Colliery, from 7 to 11 feet thick, all hard and good.

"Ventilation is very good; when I was down in December there were 43,875 cubic feet per minute in circulation for the use of 70 men. This mine is also ventilated on the separate split system, and as the workings are from both sides of the slope the main divisions of the air are also from the slope to either side; on the one side going in the level and returning by the way of the faces or stalls, and on the other, going around the faces of stalls and coming out in the level, thence to the upcast shaft; the motive power here is a fan on the top of the upcast shaft. This being the first fan that was erected in this Province on a large scale for ventilating of our mines, which has done such good service and gives such good satisfaction, so that in this colliery there are three of them working. There is now little or no gas seen in this pit. Everything is kept in good order, with plenty of everything that may be required for the successful working of a mine.

"No. 4 Pit, WELLINGTON COLLIERY.

"This is the pit overlooking the valley of the Millstone. Mining in this pit is carried on very extensively; but here, as in all the other mines, there has been considerable idle time during the past year, and that owing to the depression in the coal trade. The coal is worked from this pit by what is known as the North and South side workings. The coal in this mine is very good, although they meet with a small fault occasionally, but not enough to hinder them much. Here in this pit they have a large area of good coal in sight, which will last for years to come. This mine is now connected with the shaft previously mentioned as the No. 6 pit, and which is now the No. 4 Air-shaft, and on this shaft there is a large ventilating fan. Ventilation is good, and is conducted on the separate split system, the main division being at the bottom of the shaft to each side, and other divisions further in the workings. When I tested the air, one of the last times I was in the mine, I found there was 75,500 cubic feet per minute for the use of 112 men. This was when all the divisions had again united in one, and going towards the upcast shaft. This mine continues to give off gas at times in different places; but it is seldom the fireman finds any, as it is carried away as given off. In connection with this mine, and on the top of the upcast shaft, there is a large ventilating fan, 30x10 feet wide, worked by a large steam engine; and here there is also a large steam jet in readiness at any time to turn on steam, in case of any accident to either fan or engine. At this mine I have never found less than 400 cubic feet per minute for each man or boy.

"No. 5 Pit, WELLINGTON COLLIERY.

"In this pit there has also been considerable idle time, for the same reason as that which caused the dullness in the other mines. At one time this mine did not look as well for getting out coal as may have been wished, but for some time back it has taken a change for the better. At present it looks well, and if the coal trade and prices would justify them to do so, they have places here standing idle, where they could employ 50 more miners than they are working at present. This mine is worked on the pillar and stall system, as are all the mines belonging to Messrs. R. Dunsmuir & Sons. The coal is of the usual good quality of the Wellington seam.

"Ventilation is very good. You will observe

in my previous report that they were sinking a shaft about 80 yards south of this, the No. 5 Pit. This shaft was got down early in the year, and connected with the workings here; and now that shaft is the upcast and return for the No. 5 Pit. Motive power here is a steam engine with a fan on the top of the upcast shaft, and the last time I was down there was 54,250 cubic feet of air per minute, for the use of 70 men and 3 mules. This mine is also ventilated on the separate split system, the main divisions at the bottom of the shaft taking the levels on the east and west sides, and returning by way of the faces to the upcast shaft. Here there is also a steam jet standing in readiness to turn on steam to ventilate the mine, if any accident should happen to either engine or fan. Here, as at all the other mines in colliery, there is always plenty of timber on hand, and every other thing which may be thought necessary to the use and working of a coal mine."

EAST WELLINGTON COLLIERY,

"The property of R. D. Chandler, Esq., San Francisco. There is only one mine in this colliery and that is in the valley of the Millstone River, and south-east of the Wellington Colliery. In this mine they have been very much troubled with wants and faults in the coal, and at the best the coal has been thin. The coal worked here is what is known as the Wellington coal. The mine has been worked steadily the most of the past year. Although not taking out much coal, yet what they do get is very hard and of good quality.

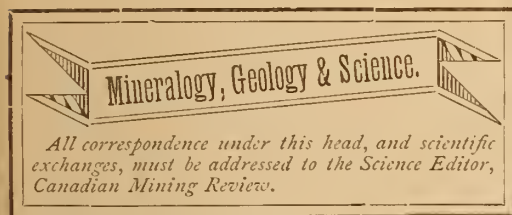
"You will have seen in my previous report that in the level going west they were in about 400 yards, and at the face they got a fault which put the coal 34 feet above the level. They went up over the fault, and continuing their level for nearly 300 yards on the upper side of the fault, with the coal varying from 5 to 6½ feet thick, good and hard, and improving as they go in. This is a good prospect, and to all appearances there will yet be a good and profitable mine here. The place where they have got the coal is a long way from the shaft, and it will be very expensive to make a good road up to get the coal down; but Mr. Wm. Chandler, the Manager, told me that if the coal keeps as good as at present, there is a likelihood of their putting down another shaft in the spring. The coal in the lower side of the fault is being worked on the long-wall system, and they are very successful with it, the coal averaging about 2½ feet thick. The refuse, and the rock taken out of the roof to make the roadway, fill the waste works full, so that the roof does not settle much, the roofing being a strong hard rock bending down gradually behind them as they work out the coal. As the roof does not break at the face, the workman hardly knows that it is settling.

"Ventilation is good; motive power, a furnace. The last time I was down, the air in circulation was 250 cubic feet per minute for each man employed. Owing to this being long-wall work, there is very little powder used, and in most of the places none at all. Sometimes the breaks in the roof, out a considerable distance from the face, give off a little gas, but at the face they never see any. There are not many men employed here, and as there is only one single shaft, they work what men they have on two shifts, sometimes three shifts a day. It is to be hoped that the coal will continue to keep good on the upper side of the fault previously mentioned, and also that it may get thicker on the lower side. Such improved prospects would be beneficial to all about the district, and the proprietor in particular. He

is deserving of such success, seeing the perseverance and push he has made here in bringing about the present position and prospects of the mine.

GENERAL.

All the above works I have frequently inspected during the past year, and I found them generally in good order, with plenty of timber and every other thing necessary on hand that was required, or may have been wanted for the carrying on and working of a mine. In the course of my inspection of the several mines, I sometimes have drawn the attention of the overman, or whoever happened to be with me at the time, to something I thought necessary to be done; and whatever it may have been, it was attended to at once. I nearly always found the brattice, as close to the face as it was convenient to have it, and it was no uncommon occurrence to get it broken down when blasting; and very often the miners complain on that account, as they do not like to break it. But in the places that are suspected of giving off gas they keep the brattice boards as close to the face as possible, if it should be broken down; and then for a few feet further they have a canvas or brattice cloth hanging from the roof, not being so much in the way as boards and serves the purpose of brattice equally well."



A Chemical View of the Metallic Minerals.*

C. F. Marsan, O.M.I., M.A.

Professor of Chemistry, University of Ottawa.

In the midst of the universal advancement of science, mineralogy is too useful and practical, not to have made immense progress during these late years. In fact every branch of it has received a new impulse. Petrography and the use of polarizing instruments has made crystallography available even in massive specimens, and in rocks of the most complex composition. Mineral chemistry, thanks particularly to the perseverance of German investigators, has discovered many new, accurate, and rapid methods of determining the constituents of minerals. Spectrum analysis has penetrated the recesses of rare elements, and found secrets so far left unrevealed. The list of species has received many curious additions, whilst in a more practical field all the mining industries have found in science most profitable suggestions.

Yet, surprising as it may seem, the elementary study of mineralogy has not benefitted by all this progress. The science, itself, has advanced, but the teaching of it has continued in the old paths, opened in the infancy of the science, and ever since trodden by routine. The result of this has been to discourage every effort for making the study of minerals more attractive and popular. If we except the analyst, who examines minerals as he would any other substance, and the practical min-

eralogist, who uses the blowpipe to verify the determination suggested mainly by the familiar appearance of the minerals. There are very few who pay any attention to mineralogy. You have not here, as in the other sciences, that multitude of young naturalists, who, though not conversant with all the scientific mysteries of their favorite branch, are, however, ardent and enthusiastic pursuers of the most accessible truths of Botany, Ornithology or Entomology. It is a well known fact also, that mineralogy has never yet received much consideration as a means of forming the intelligence of youth. Its place, when it had any, outside of exclusively scientific or technical programme of study, has been insignificant. Teachers have doubted its efficiency in training the mind, and students have either repulsed it as an unnecessary taxation of the memory, or adopted it only as a mechanical amusement.

In a lecture delivered before the Mineralogical Society of the College of Ottawa two years ago, and in a paper read before the Ottawa Field Naturalist's Club, in February, 1886, I advocated the introduction of a new system for the teaching of Mineralogy. Convinced that the failure of making this study both beneficial and attractive, was the outcome of certain defects, I suggested a method which to me seemed to avoid most of these defects and to introduce certain features which belong essentially to the science, though they had not been taken advantage of in the elementary study of the science. My first opening on this subject was rather a speculative venture, but ever since I have endeavoured to make a practical application of the method then outlined. The result of my experiment, with special reference to the study of metallic minerals, is the subject of this paper.

Practice must always be based upon principles. The first principle in the matter now before us is the absolute dependence of mineralogy upon chemistry. Mineralogy has no laws of its own, no principle; these it has borrowed from chemistry. This may at first seem strange, as chemistry belongs to physical science, whilst mineralogy is justly regarded as constituting a branch of natural history, as botany, zoology, &c. But there is a great difference between mineralogy, and its sister natural science. Whilst botany and zoology themselves depend upon chemistry for the laws which govern all matter, in whatever form it may exist, they take their special features and ultimate constitution from biology, the great science of life. For in the vegetable and animal kingdoms, the universal forms of inanimate matter, though governed by the same physical and chemical agencies, are absorbed by that mysterious power which is called life. Not so in the mineral kingdom. In the absence of life matter displays its own remarkable power, and the results coming from this single source follow with a mathematical accuracy. In the cabinet of the chemist, or in the secret laboratories of nature itself, the same agencies are ever at work, and the merely conventional distinction between artificial substances and minerals proper falls to the ground in presence of the production, by the chemist, of the very wonders of the mineral world. Chemistry is, therefore, the parent science of mineralogy. It supplies to the latter its principles, its laws, its very classification. And yet in one actual system the study of mineralogy has very little connection with chemical science. Though as a rule a course of chemistry precedes that of mineralogy, yet the student who ventures into the class of mineralogy, without any chemical knowledge, is scarcely less favoured than his

better prepared companions. Thus severed from its natural source, descriptive mineralogy is little more than a list of species more or less connected with each other, *but never sufficiently* to give a general view of the science, and to exhibit these great principles of chemical theory of which some mineral groups are the most striking illustration. You easily perceive how this separation detracts from the practical usefulness of mineralogy as a means of training the mind in general, and in particular raising it to the comprehension of the beautiful principles of natural science. But it has also another effect detrimental to the study itself. The separation of mineralogy from chemistry must necessarily entail the separation of determinative from descriptive mineralogy. For as soon as the determination of minerals is effected independently of chemistry, other characters are resorted to, and properties of minor order must serve almost alone to identify mineral species. A new system of classifying minerals has thus been created, a system as distinct from the logical classification as would be an entirely new science. One must of course use this system in the absence of any other; and practical mineralogists have at all times made use of it. But how could it be rationally introduced in a higher science or art? Would it not necessarily create confusion instead of light in the mind of the student? Must it not destroy all sentiment of order, all idea of logic, and induce men to believe that nature is a vast museum, where all specimens are labelled, but classified, and where the writer may begin at the end, or in fact at any part of the vast collection, and adopt whatever system his fancy may originate. Yet, with its imperfection determination plays an important part and cannot for usefulness and interest be replaced by any other mode of study, whether in this or any other branch of natural history.

The question, therefore, naturally arises: Is it possible to construct a system of teaching where everything will take its proper place, and where chemistry specially will be given the prominence due to it? Will that same system employ determination as the natural road to lead to the knowledge of minerals? Finally, will that system admit of being sufficiently elementary to agree with the manifold requirements of the programmes of our high schools and colleges, and yet sufficiently thorough not to deserve to be ranked with that superficial daubing of science which is next worse to complete ignorance?

I hope that the system which I want to propose may be itself a satisfactory answer to all these questions, and I proceed without any further preliminary to give the details of this new scheme.

(To be Continued).

Summary of Meetings.

Mineralogical Society of the College of Ottawa.

February 2nd.—The society held its semi-annual elections; the meeting being presided by the director, Rev. C. F. Marsan, O.M.I., M.A. The following officers were elected: President, M. Fallon, class of 1889, of Kingston, Ont.; Vice-President, J. P. Reynolds; Treasurer, E. Leonard; Recording Secretary, D. R. Macdonald; Scientific Secretary, Rev. Bro. Gauvreau, O.M.I.; Councillors, F. Mudget, T. Smith; Chemist, A. L. Tourchot, B.A.; Librarian, R. Paradis; Curator of the Museum, J. Paradis.

February 16.—Mr. D. R. Macdonald read a paper on "heat" as a geological agent.

*Paper read before the Field Naturalist Club, of Ottawa, March 3rd, 1887.

February 23rd.—An analysis of *Celestite*, by Rev. G. Gauvreau, elicited a certain proportion of Barium Sulphate, and some curious observations with respect to the crystallization.

March 2nd.—Mr. D. B. Thibaudeau read an instructive essay on the properties and manufacture of iron. A publishing committee was then appointed, composed of the following gentlemen: M. M. C. Kennedy, L. Dausereau, F. Mudgett, E. Leonard, J. Paradis and C. Gaudet.

British Columbia.

Railroading Across the Rockies—Natural Obstacles, and How They are Overcome—A Brantford Firm's Contribution to the Work.

The Waterous Company, of Brantford, have received the following interesting letter:—

ROSS SAW MILL, Duggan's Siding, B. C.
C. H. Waterous, Jr., Waterous Eng. W. Co.
Brantford.

DEAR SIR,—As I have now finished here cutting with the mill, I thought that you would be pleased to know how it worked and what amount this mill is able to cut when run with proper care. As it is the first of this particular style of mill (25 h. power) you have sent to the Rockies, and as I have kept an account of all expenses of running this mill and the amount it cut, I am able to give you a correct statement of what it cost to handle lumber in this part. Any of your customers may rely upon the truth of my statements. As you are aware, I left Brantford on the 26th May, the mill being shipped at the same time. I arrived at the Rockies on the 8th of June, by way of the Canadian Pacific Railway. The mill arrived on the 12th and on the 21st we started to saw, and by the 8th of November we had cut 3,500,800 feet. The last month's cutting was the largest, amounting to 817,000 feet. These are the figures of the measurer employed by the C. P. R., and are correct, making an average of 31,423 feet per day of not more than 13 running hours per day. This was all cut into inch boards, and 3 and 4 inch planks, and all sized to 8, 10, 12 and 14 wide. All the cutting and edging had to be done with the large saw as we had no edger. The timber was spruce, pine, fir, cedar and hemlock. I see in some of your circulars that you give the amount of what has been cut per hour and per day, but I thought it would be more satisfactory to you and to your customers to know what such a mill could do in the season, and you may rely upon this statement as being absolutely correct during this time. The expenses for repairs only amounted to \$1.50, viz., for 1 bolt in friction lever, 1 bolt in saw lever, and repairs on timber gauge. This mill was never stopped one working hour during the whole season. The new pul-dogs are a complete success, they are quick and sure to hold every time. I am satisfied that there need be no trouble or delay in running these mills if they are properly looked after. There was no extra chance to make this mill run any better than any other. The men were all picked up as they came along. The only man that had any experience in a mill was the sawyer. I filed the saws myself and kept all other things right. It might be interesting for you to know how much timber it takes to build one of these snow-slide sheds per mile. It takes over 6,461,300 ft. of timber and 62,030 bolts 36 in. long, and 200,000 spikes 10 in. long. I do not refer above to the ordinary snow sheds such as used on the Intercolonial Railway, these are used here also where snow is likely to drift in, but in speaking above I refer to what might more properly be called snow slides. They are built at a point where snow-slides are apt to occur, always in the face of steep and high mountains. One side (the high side of shed) is built up into the side of the mountain and has a slant over the track something like a shed roof. They are wonderfully strong and you may be sure none too much so, as the accumulated snow of many years may start from the top of these lofty hills and come thundering down in masses 50 to 100 or 200 feet thick, with a force that nothing can resist unless it is the mountain on the other side of the valley from which the slide takes place. The snow in passing down slides over the top of the snow slide and passes on down into the valley and on up, may be several hundred feet up, the side of the mountain opposite. One can imagine what would be the result of such a slide striking a passing train. Certainly nothing but pieces of the smashed up wreck, that would be unrecognizable, would ever be found. Near where I am one of these slides happened. The snow came down the mountain in a body estimated to

be 175 feet thick. It struck the track and carried it bodily down the mountain to the valley across the river that flowed through the valley, and up the opposite side to about the same height. There was where the railway track was found after the snow melted. Some cars were wrecked at the same time, and were never found, probably the remains were carried down by the melting snow to the Columbia River, and then out to the Pacific Ocean. The location here is a very beautiful one. A photographer who is out among the mountains taking views for the Canadian Pacific, came along one day and took a picture of the mill, and I send you one which will give you a very fair idea of what the place looks like. The mountain that you see to the left is over 5,000 feet high from the railway track. The white spot between the higher and lower peak is snow, and lies in that hollow place all the year round, and that snow is supposed to be 250 feet deep, and is a glacier, it is full of numerous cracks. The men have dropped lines down some of these cracks for over 100 feet without reaching the bottom. The sharp high peak seen on the picture is rough and jagged and difficult to climb. There was a rain cloud floated up against this peak once and burst, letting out a flood of water that brought everything down the mountain with it. Enormous rocks and trees were apparently no obstruction whatever. The course of the water made a clear sweep, and its peak is easily seen yet. As it came down the rocks and trees that it bore up would sometimes lodge in narrow places on the sides of the mountain and be piled up 150 or 200 feet high, but the weight of water behind would soon be so great that the dam would give way, and down would come the water again, and rocks, trees, etc., and so it kept on until it reached the river, which was raised by this flood until the water stood 20 feet over the track. This cloud burst did a great deal toward preparing the mill site. Level places, large enough to build a mill on are hard to get up here in the mountains. There are some very interesting things up here, and one need not get very lonesome if he has any taste for curious nature. A little way from the mill are soda springs and hot springs, so you can have both a plain soda and a hot bath, one or both, as you choose, and no thanks to any one. Soda plain, however. No liquor is allowed up here, which is a good thing, where so many and such different kinds of men are employed away from law and order.

I have been up the Roumanian, Bulgarian and Thuringian mountains, but the mountains here, I think, are much grander. It is not possible to picture them. However, as you have been on the Andes and Alps, you can think back a few years to the time we were in Santiago, Chili (I now see by the papers you are the Hon. Vice-Consul of that progressive republic), and used together take a walk to the top of Santa Lucia and look off to the snow-capped Andes it will give you an idea of this place. Only I am here in the very midst of them; then we were at a distance. Should you or any of the Brantford people be taking a trip over the Canada Pacific to British Columbia they can remember when going through these sheds that Brantford saw mills with Brantford brains and muscle cut the six million or more feet of lumber that is required to build each mill. For this is not the only one of your mills here; there are a number of them, and I can tell you it does me good to know that no other mill, American or Canadian (and there are a good many, especially of the former, scattered around the mountains), have done as much or as good work as our own mills. I naturally feel a pride in the old shop and what it does. I have been with you now some 30 years, and there are there still at work men who commenced before I did, and I want you to let them know what this mill has done up here, for I know they will be glad to hear from it, and that their work is a success. As I am writing, my mind turns back to a time when we were having one of our annual shop picnics about the time the Canada Pacific was first being talked about. Mr. Robertson, of the Bank of British North America, was making a few remarks and spoke about the great railway, and said that it was sure to be built, and would carry from ocean to ocean the Brantford saw-mills. We have seen that now all come to pass, and that his forecast of the future was correct. I have seen the Brantford saw-mills go ahead and cut the timber to build the railway bed, the stations, and the fences, and now we have turned back and are cutting the timber and plank to cover the road where it is necessary to protect it from the snow. I have made this letter too long, but there is so much here to be seen and to write about that when you start to write you do not know when to stop. But I knew you take an interest in such things as are to be seen here. And I would say come along and see for yourself, and I am sure you will be well satisfied and paid for your trip. With no more at present,

I am your old fellow-traveller,

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Mining Regulations

TO GOVERN THE DISPOSAL OF

Mineral Lands other than Coal Lands, 1886.

THESE REGULATIONS shall be applicable to all Dominion Lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, iron or other mineral deposits of economic value, with the exception of coal.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein either by surface or subterranean prospecting for mineral deposits, with a view to obtaining under the Regulations a mining location for the same but no mining location or mining claim shall be granted until the discovery of the vein, lode or deposit of mineral or metal within the limits of the location or claim.

QUARTZ MINING.

A location for mining, except for iron on veins, lodes or ledges of quartz or other rock in place shall not exceed forty acres in area. Its length shall not be more than three times its breadth and its surface boundary shall be four straight lines, the opposite sides of which shall be parallel, except where prior locations would prevent, in which case it may be of such a shape as may be approved of by the Superintendent of Mining.

Any person who has discovered a mineral deposit may obtain a mining location therefor, in the manner set forth in the Regulations which provides for the character of the survey and the marks necessary to designate the location on the ground.

When the location has been marked conformably to the requirements of the Regulations, the claimant shall within sixty days thereafter, file with the local agent in the Dominion Land Office for the district in which the location is situated, a declaration or oath setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as afore-said; and shall, along with such declaration, pay to the said agent an entry fee of FIVE DOLLARS. The agent's receipt for such fee will be the claimant's authority to enter into possession of the location applied for.

At any time before the expiration of FIVE years from the date of his obtaining the agent's receipt it shall be open to the claimant to purchase the location on filing with the local agent proof that he has expended not less than FIVE HUNDRED DOLLARS in actual mining operations on the same; but the claimant is required, before the expiration of each of the five years, to prove that he has performed not less than ONE HUNDRED DOLLARS' worth of labor during the year in the actual development of his claim, and at the same time obtain a renewal of his location receipt, for which he is required to pay a fee of FIVE DOLLARS.

The price to be paid for a mining location shall be at the rate of FIVE DOLLARS PER ACRE, cash, and the sum of FIFTY DOLLARS extra for the survey of the same.

No more than one mining location shall be granted to any individual claimant upon the same lode or vein.

IRON.

The Minister of the Interior may grant a location for the mining of iron, not exceeding 160 acres in area which shall be bounded by north and south and east and west lines astronomically, and its breadth shall equal its length. Provided that should a person making an application purporting to be for the purpose of

mining iron thus obtain, whether in good faith or fraudulently, possession of a valuable mineral deposit other than iron, his right in such deposit shall be restricted to the area prescribed by the Regulations for other minerals, and the rest of the location shall revert to the Crown for such disposition as the Minister may direct.

The regulations also provide for the manner in which land may be acquired for milling purposes, reduction works or other works incidental to mining operations.

Locations taken up prior to this date may, until the 1st of August, 1886, be re-marked and re-entered in conformity with the Regulations without payment of new fees in cases where no existing interests would thereby be prejudicially affected.

PLACER MINING.

The Regulations laid down in respect to quartz mining shall be applicable to placer mining as far as they relate to entries, entry fees, assignments, marking of localities, agents' receipts, and generally where they can be applied.

The nature and size of placer mining claims are provided for in the Regulations, including bar, dry, bench creek or hill diggings, and the RIGHTS AND DUTIES OF MINERS are fully set forth.

The Regulations apply also to

BED-ROCK FLUMES, DRAINAGE OF MINES AND DITCHES.

The GENERAL PROVISIONS of the Regulations include the interpretation of expressions used therein; how disputes shall be heard and adjudicated upon; under what circumstances miners shall be entitled to absent themselves from their locations or diggings, etc., etc.

THE SCHEDULE OF MINING REGULATIONS

Contains the forms to be observed in the drawing up of all documents such as:— "Application and affidavit of discoverer of quartz mine." "Receipt for fee paid by applicant for mining location." "Receipt for fee on extension of time for purchase of a mining location." "Patent of a mining location." "Certificate of the assignment of a mining location." "Application for grant for placer mining and affidavit of applicant." "Grant for placer mining." "Certificate of the assignment of a placer mining claim." "Grant to a bed rock flume company." "Grant for drainage." "Grant of right to divert water and construct ditches."

Since the publication, in 1884, of the Mining Regulations to govern the disposal of Dominion Mineral Lands the same have been carefully and thoroughly revised with a view to ensure ample protection to the public interests, and at the same time to encourage the prospector and miner in order that the mineral resources may be made valuable by development.

COPIES OF THE REGULATIONS MAY BE OBTAINED UPON APPLICATION TO THE DEPARTMENT OF THE INTERIOR.

A. M. BURGESS,

Deputy Minister of the Interior.

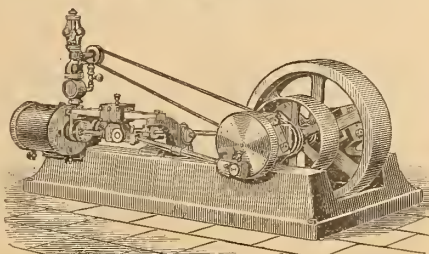
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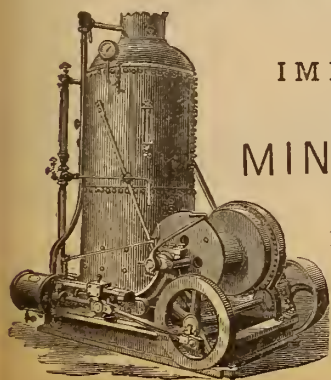
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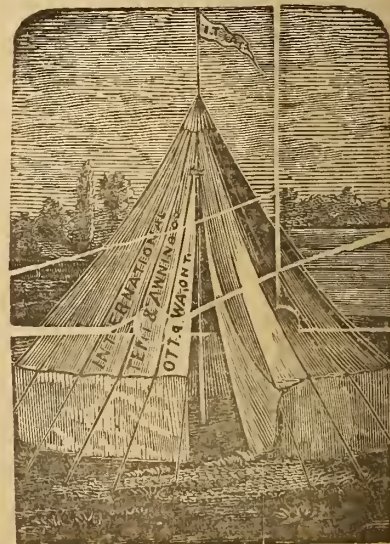
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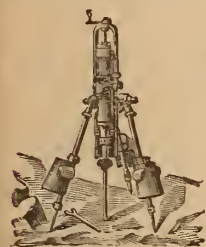
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1887.—OTTAWA, APRIL—1887.

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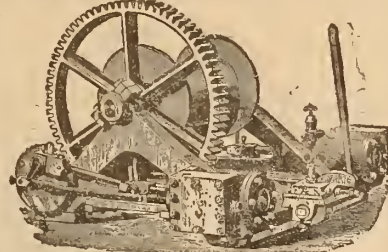
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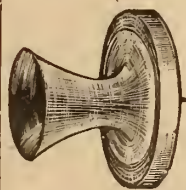
P. O. Box 112, Pictou, Nova Scotia.

Mining Areas Prospected,

THE EXISTENCE, SIZE AND EXTENT OF MINERAL VEINS DETERMINED,
"Cores" cut from the Solid Rock showing the Nature and Dip of the Strata.
ARTESIAN WELLS PUT DOWN ANY DISTANCE TO 1000 FEET.
Full Information and References given on Application.

THE HARBERT TELEPHONE.

(For Private Lines)



SOLD outright. No
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or mining districts.
Over 5000 in use. Pat.
Nov. 30, 1880. Late
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EDW. HARBERT & Co.,
159 LaSalle St., Chicago, Ill., U.S.A.

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Metallurgical Works

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E. N. RIOTTE, - - Manager.

Ores Sampled, Working Test by any Process, Assay, Analyses of Ores, Mineral Waters and Products, Mines Examined and Mills Started.

GRAPHITE

Wanted, fair average samples
of about 1lb. each, with prices,
F.O.B. Address:

J. S. MERRY, Assay Office,
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OTTAWA PHOSPHATE REGION.

Copies on plain paper - - - \$1.00
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The Canada Co.

Will issue Licences to Prospect or
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Mineral Reservations,

Covering nearly a

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In Eastern Ontario, and principally
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Iron, Phosphate, Gold, Galena,
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Building Stone,
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For list of lands and terms apply to the
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**Steel Portable and Stationary
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Always on hand a full stock of all kinds of
Steam-Fittings, Packing, &c.

Estimates Furnished. Easy Terms.



NOTICE.

SEALED TENDERS, addressed to the undersigned, and endorsed "Tender for Indian Supplies," will be received at this office up to noon of SATURDAY, 30th April, 1887, for the delivery of Indian Supplies during the fiscal year ending 30th June, 1888, consisting of Flour, Bacon, Groceries, Ammunition, Twine, Oxen, Cows, Bulls, Agricultural Implements, Tools, &c., duty paid, at various points in Manitoba and the North-West Territories.

Forms of tender containing full particulars relative to the Supplies required, dates of delivery, &c., may be had by applying to the undersigned, or to the Indian Commissioner at Regina, or to the Indian Office, Winnipeg.

Parties may tender for each description of goods (or for any portion of each description of goods) separately or for all the goods called for in the Schedules, and the Department reserves to itself the right to reject the whole or any part of a tender.

Each tender must be accompanied by an accepted Cheque on a Canadian Bank in favour of the Superintendent General of Indian Affairs for at least five per cent. of the amount of the tender which will be forfeited if the party tendering declines to enter into a contract based on such tender when called upon to do so, or if he fails to complete the work contracted for. If the tender be not accepted, the cheque will be returned.

Tenderers must make up in the Money columns in the Schedule the total money value of the goods they offer to supply, or their tender will not be entertained.

Each tender must, in addition to the signature of the tenderer, be signed by two sureties acceptable to the Department, for the proper performance of the contract.

When implements of a particular make are mentioned it is because the articles so designated suit the Department for the purpose required better than others; in such cases the competition between tenderers must, of course, be in the transportation to the place of delivery.

In all cases where transportation may be only partial by rail, contractors must make proper arrangements for supplies to be forwarded at once from railway stations to their destination in the Government Warehouse at the point of delivery.

Tenderers will please note carefully the following conditions—

1. Supplies will not be paid for until the Department has been assured of the satisfactory delivery of each article for which payment is claimed.
2. No tender for supplies of a description different to that given in the index will be considered, and supplies which are found, on delivery, to be of a kind or quality different to those described, will be rejected by the agents of the Department; and the contractor and his sureties will be held responsible for any loss entailed on the Department through failure to deliver in accordance with terms of contract.
3. It must be distinctly understood that supplies are to be delivered at the various points for the prices named in the tender; that no additional charge for packing or any other account will be entertained, and that an invoice must accompany each separate delivery of supplies. An invoice for each separate delivery must also be sent to the Department of Indian Affairs at Ottawa, and one to the Indian Commissioner at Regina, if the supplies are for the North-West Territories. When the supplies are for points in the Manitoba Superintendency the triplicate invoice should be sent to E. McColl, Winnipeg.
4. Prices must be given for articles to be delivered at each point of delivery named in the Schedule for each article for which a tender is submitted, and not an average price for each article at all points of delivery; no tender based on a system of averages will be considered.
5. Tenderers should understand that they must bear the cost, not only of sending their samples to the Departments of Indian Affairs but also freight charges incurred in returning such samples to the tenderer.
6. When supplies are to be delivered "equal to sample," tenderers should understand that the sample is to be seen either at the Department of Indian Affairs, at the office of the Indian Commissioner at Regina, at the office of the Inspector in charge at Winnipeg, or at any one of the undermentioned Indian Agencies.

MANITOBA.

Agent. Agency.

H. Martineau... The Narrows, Lake Manitoba.
F. Ogilvie... Portage la Prairie.
A. M. Muckle... St. Peter's.
R. L. N. Fisher... Fort Francis.
G. M. Phelan... Assiniboine.
John McInyre... Sarnia.
J. Reader... Grand Rapids.
A. MacKay... Berens River.

NORTH-WEST TERRITORIES.

Agent. Agency.

J. A. Markle... Birtle
J. J. Campbell... Moose Mountain.
A. McDonald... Crooked Lakes.
W. S. Grant... Assiniboine Reserve.
P. H. Williams... File Hills.
J. B. Lash... Muscowpetung's Reserve.
H. Keith... Touchwood Hills.
J. M. Rae... Prince Albert.
J. A. MacKay... Battleford.
G. G. Mann... Onion Lake.
J. A. Mitchell... Victoria.
W. Anderson... Edmonton.
S. B. Lucas... Peace Hills.
W. Pocklington... Blood Reserve.
M. Begg... Blackfoot Crossing.
W. C. de Balinhard... Sarcee Reserve.
and that no attention will be paid to a sample of any article which may accompany a tender, if a standard sample of such article is on view at the Department of Indian Affairs or any one of its Offices or Agencies aforesaid.
7. These Schedules must not be mutilated—they must be returned to the Department entire even if the supply of one article only is tendered for—and tenderers should in the covering letter accompanying their tender, name the pages of the Schedule on which are the articles for which they have tendered.
The lowest or any tender not necessarily accepted.

L. VANKOUGHNET,

Deputy to the Superintendent-General of Indian Affairs

Department of Indian Affairs,
Ottawa, February, 1887.



Department of Inland Revenue.

An Act respecting Agricultural Fertilizers.

The public is hereby notified that the provisions of the Act respecting AGRICULTURAL FERTILIZERS came into force on the 1st of January 1886 and that all Fertilizers sold thereafter require to be sold subject to the conditions and restrictions therein contained—the main features of which are as follows:

The expression "fertilizer" means and includes all fertilizers which are sold at more than TEN DOLLARS per ton, and which contains ammonia, or its equivalent of nitrogen, or phosphoric acid.

Every manufacturer or importer of fertilizers for sale, shall, in the course of the month of January in each year, and before offering the same fertilizer for sale, transmit to the Minister of Inland Revenue, carriage paid, a sealed glass jar, containing at least two pounds of the fertilizer manufactured or imported by him, with the certificate of analysis of the same, together with an affidavit setting forth that each jar contains a fair average sample of the fertilizer manufactured or imported by him; and such sample shall be preserved by the Minister of Inland Revenue for the purpose of comparison with any sample of fertilizer which is obtained in the course of the twelve months then next ensuing from such manufacturer or importer, and which is transmitted to the chief analyst for analysis.

If the fertilizer is put up in packages, every such package intended for sale or distribution within Canada shall have the manufacturer's certificate of analysis placed upon or securely attached to each package by the manufacturer; if the fertilizer is in bags it shall be distinctly stamped or printed upon each bag; if it is in barrels, it shall be either branded, stamped or printed upon the head of each barrel or distinctly printed upon good paper and securely pasted upon the head of each barrel, or upon a tag securely attached to the head of each barrel; if it is in bulk, the manufacturer's certificate shall be produced and a copy given to each purchaser.

No fertilizer shall be sold or offered or exposed for sale unless a certificate of



TENDERS.

SEALED TENDERS, marked "For Mounted Police Provisions and Light Supplies," and addressed to the Honorable the President of the Privy Council, Ottawa, will be received up to noon on Monday, May 30th, 1887.

Printed forms of tenders, containing full information as to the articles and approximate quantities required, may be had on application at any of the Mounted Police Posts in the North-West, or at the office of the undersigned.

No tender will be received unless made on such printed forms.

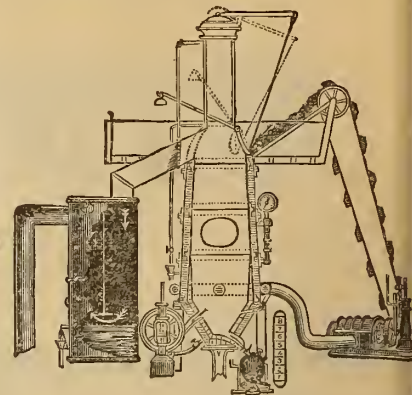
The lowest or any tender not necessarily accepted.

Each tender must be accompanied by an accepted Canadian bank cheque for an amount equal to ten per cent. of the total value of the articles tendered for, which will be forfeited if the party declines to enter into a contract when called upon to do so, or if he fails to complete the service contracted for. If the tender be not accepted the cheque will be returned.

No payment will be made to newspapers inserting this advertisement without authority having been first obtained.

FRED. WHITE,
Comptroller, N. W. M. Police.
Ottawa, March 25th, 1887.

The engraving represents the
Hartsfeld Transportable Water Jacketed Smelting Furnace, Metal Dust Condenser and a Separator Crucible, manufactured by the



HARTSFELD

Portable Smelting Furnace and Mining Co.,

NEWPORT, KENTUCKY, U.S.A.,

In sizes from 5 to 60 ton capacity, and by the following licensed manufacturers on Royalty.

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W. T. GARRETT & CO., San Francisco, Cal., for the Pacific Coast.

McILVAIN & SPIEGEL, Cincinnati, Ohio.

Letters Patent have been secured in all principal foreign countries, and are sold in shares, trade, royalty or otherwise. Run your eye over this and return answer: silence means no! Catalogue free.

This furnace requires no more care or attention than an ordinary steam boiler, and can be run as long and with as little loss of time or expense for repairs. Full information will be furnished by the

Hartsfeld Portable Smelting Furnace & Mining Co.

P.O. BOX 115 NEWPORT, Ky., U.S. of A.

Reduction Works, No. 90 and 92 Thornton St.



SEALED TENDERS, marked "For Mounted Police Clothing Supplies," and addressed to the Honorable the President of the Privy Council, Ottawa, will be received up to noon on Monday, 2nd May, 1887.

Printed forms of tender, containing full information as to the articles and quantities required, may be had on application to the undersigned.

No tenders will be received unless made on such printed forms. Patterns of all articles may be seen at the office of the undersigned.

Each tender must be accompanied by an accepted Canadian bank cheque for an amount equal to 10 per cent. of the total value of the articles tendered for, which will be forfeited if the party declines to enter into a contract when called upon to do so, or if he fails to complete the work contracted for. If the tender be not accepted the cheque will be returned.

No payment will be made to newspapers inserting this advertisement without authority having been first obtained.

FRED. WHITE,
Comptroller, N. W. M. Police.
Ottawa, March 25th, 1887.



NOTICE RESPECTING PASSPORTS.

PERSONS requiring passports from the Canadian Government should make application to this Department for the same, such application to be accompanied by the sum of four dollars, in payment of the official fee upon passports as fixed by the Governor-in-Council.

G. POWELL,
Under Secretary of State.
OTTAWA, 19th Feb., 1886.

Canadian Mining Review,

OTTAWA.

PUBLISHED MONTHLY.

ANNUAL SUBSCRIPTION \$1.00

ADVERTISING RATES . . . 15c. per line (12 lines to 1 inch).

OFFICE:

UNION CHAMBERS, 14 Metcalfe St.

The CANADIAN MINING REVIEW, is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts, as well as others interested in Canadian Mineral Lands, are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 17th of the month.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

Advertising Space.

The circulation of the CANADIAN MINING REVIEW, which has steadily been going up since its first publication, more than five years ago, has now more than doubled the estimate upon which we had reckoned, and its value as an advertising medium to business men who wish to reach the best classes of mine owners and operators, and the mining centres and camps of every province in the Dominion, is consequently very greatly enhanced. The REVIEW is in the widest sense a Canadian journal belonging to all provinces alike; it is the only journal published in Canada wholly devoted to the interests of her mining industries and mineral resources. We would simply draw the attention of those who have hitherto overlooked it, to this matter, promising our best attention and most reasonable terms on any application for advertising space.

A National Museum.

That there is a necessity for a National Museum has long been conceded, and the consensus of public opinion points to the present as a fitting season to press upon the Dominion Government the urgency of its speedy erection. It might be worth while to view the matter both from an economic and scientific standpoint. We place the former first, as, to the great mass of the people, this is of the first importance, the scientific aspect being chiefly for the few, although absolutely necessary as a basis for the proper working of the institution. Many suggestions have been made regarding the scope of the proposed institution, and many places have been named as suitable for its site at Ottawa, but it is not our intention to enter into these points other than to say that such a National Museum should be an extension of the

present Government Geological and Natural History Survey Museum at Ottawa, and should be kept strictly within the lines of that excellent Department. According to Act of Parliament this Survey now includes within the range of its operations the three kingdoms of nature as represented in our Dominion, and necessarily the new National Museum must include all these branches of its work. Keeping in view the objects of the Government when the Act was passed, Dr. Selwyn, the Director of the Survey, has steadily kept this in view in the arrangement of the present Government building, and although the space is very much cramped, both the economic and the scientific aspects have been carefully kept in view. Visitors to the museum can see a double arrangement of the mineral sections showing an economic and a scientific aspect, and the same arrangement in the animal, vegetable and other sections would have been carried out had space permitted. At the recent Indian and Colonial Exhibition our exhibitors were able to show the economic value of our resources by their wonderful collections of food fishes, large mammals and birds suitable for food. There too were shown the products of our mines, of our forests, and of our fields. Here in our own Capital we cannot show even to our members of Parliament the wealth of our country, and many of them are as ignorant of our great national resources as the veriest stranger who comes within our gates.

We do not want a building to cover acres of ground and cost millions of money, but we do want one large enough to exhibit the whole natural products of the country, and on such a scale as will make it possible to bring together from every portion of our great Dominion, as well as from foreign countries, such a collection as would be of great practical benefit to all Canadians engaged in industrial and scientific pursuits. To do this properly would require at least a building of three stories. The ground floor for minerals; the middle for fossils, and the top flat for botany and zoology. On this plan the heavy exhibits would be placed at the base and the lighter at the top. With the exception of offices, a building one-third larger than the present museum would be amply sufficient for many years.

Many reasons might be adduced in favor of the project but we only advance a few. The principal one is the insecurity of the present building. It may be destroyed by fire at any time. At present it holds the most precious collection of minerals, fossils, and botanical specimens contained in any one building on the American continent. The loss of such a valuable collection would be irreparable.—In a monetary sense they represent more than a million of dollars. They include much of the life work of Sir William Logan, Billings, Whiteaves, and Macoun, besides the gatherings of over forty years of the various other members of the staff. Surely these are worthy of a better fate.

Throughout the world to-day the cry is arising give us food for the mind as well as for the body, and the answer has been given almost everywhere, except Canada, by the erection and equipment of national museums for the enlightenment of the people. New South Wales, with a population less than that of Ontario, gave £15,000 last year to its museum in Melbourne. In the United States the practical aspect of the case has taken hold of the people, and in every State economic and scientific museums are being established, and specialists appointed to arrange and keep them in order. While the new Departmental and other public buildings, of which any nation might feel proud, were in course of construction, it was hardly proper to press this matter upon the government, but now that these are nearing completion it is both right and proper that the facts should be placed before the representatives of the people, and that they should be asked to assist the government, by their support, in projecting a scheme that will place Canada abreast of the other nations of the civilized world in the march of improvement.

The Yukon Expedition.

In a few days Dr. Dawson, Assistant Director of the Geological and Natural History Survey, accompanied by a small party, will start out on his expedition to the Yukon country. There he is to personally conduct the work relating to the Geological and Natural History of the country, and also to supervise that section of the exploration necessary to the topographical work. Mr. William Ogilvy, D.L.S., and astronomer, Ottawa, is to take charge of the topographical work, and will make an accurate survey and measurement of as much of the Yukon as lies within British territory. It is thought that Mr. Ogilvy will remain in the district during the whole of the winter of 1887, but Dr. Dawson is to return next fall by the Chilkoot Yukon route, which will enable him to obtain accurate geological data of the whole route to be traversed by the expedition. It is likely that the portion of the expedition under Dr. Dawson's charge will be able to make an exploratory and track survey, with astronomical determination of points on the Stickeen River, and the remainder of the route, until he joins Mr. Ogilvy, which will materially add to the geographical and geological knowledge of the whole region. The expedition will leave Victoria, British Columbia, early in May, and it is calculated that Mr. Ogilvy will reach the summit of the Perrier Pass about the 1st of June, and that after a junction has been effected there he will have a clear month within which to explore the surrounding country and yet enable Dr. Dawson to get out in the fall before the rivers are frozen. A great deal has been said and written about the mineral resources of this section of that great northern land, and it has been

announced that gold exists there in abundance. During the past summer we are informed that on a bar of the Stewart river as high as \$150 per day to the hand was made for 28 consecutive days. On the Salmon River from \$25 to \$50 per day was taken out, and many other districts are mentioned where the efforts of the miner have met with more than average success. These are cited to prove that a great mining future is in store for that section of the North-West that is drained by the waters of the mighty Yukon. Some again do not speak so favourably of it. They say that the mining which is almost entirely Placer has been very largely exaggerated, and that many after undergoing extreme hardship and privation have been glad to get out of the country alive. Provisions, and food of any kind are so scarce and difficult to obtain that those adventurous spirits who have penetrated within the lines of that great lone land have but barely existed. In the absence of any information that is absolutely trustworthy, a great rush to the country at present is to be avoided. Such would only result in disaster to the parties themselves and to the industry which they would seek to cultivate. Dr. Dawson's expedition will do much to reveal the true state of affairs. From a practical as well as a scientific standpoint the expedition is of the utmost importance to the country.

Our Geological Survey.

The Federal Government of the United States appropriated in 1884, for this branch of the State surveys, the sum of \$339,640, being an increase on the amount voted in former years. The following Local or State Governments set apart for their local Geological Survey, or in the interests of the mining development in these states, the following sums: California, \$15,000 a year for State Mining Bureau; Indiana, \$5,000 a year; New York, \$16,000. The following states have in former years made similar appropriations for this purpose, and are now in receipt of the benefits to be received from so safe an investment of the public funds as the sure result of the most complete knowledge of the mineral resources within the State, viz: Ohio, Wisconsin, Michigan, Minnesota, Iowa, Illinois, Tennessee.

The latest Report on the Mineral Resources of the United States by Albert Williams, Jr., for the year 1882, gives the total mineral production during that year for all the States at \$453,912,406. In round numbers the large sum of four hundred and fifty-four millions of dollars, it having increased from 1882 till this time.

The total mineral production of Canada cannot be ascertained from the census of 1880-81 as the number of tons of each class of product only is given, and value per ton is not mentioned, and hence the necessity that this matter should receive attention when the proposed Labor Bureau is organized.

The Dominion of Canada expends annually about \$100,000 for Geological Survey purposes, including Natural History, but this must not be understood to be for exploration of Dominion Land alone, as the larger proportion or almost all of the sum is annually expended in the interests of the respective Provinces. This small appropriation is devoted to the Geological investigation of an extent of country covering an area of 3,500,000 square miles, and is territorially about equal in extent to the continent of Europe and larger in area than the United States and territories, but exclusive of Alaska. The Provincial or Local Governments at present do no Geological work, but in Newfoundland, which is not yet a Province of the Dominion, the sum of several thousand dollars has been of late years expended, and the minerals are retained by the Government for lease.

The Scientific and Educational uses of Geological work are of the highest importance, dealing with questions such as the origin of rocks and minerals, the changes that have taken place in the crust of the earth and are now taking place, these are the processes of formation and disintegration and result in the building up or destruction of continents, and many other subjects of interest not only to men of science but to the human race:—the true order and condition of things as they were and are now, reduced as Professor Huxley expresses it "to one long chain in the ceaseless causation of nature." The economic uses, however, interest us most and may be divided into four parts for purposes of illustration. The first necessity for the Geologist is a correct map or plan of the country to be examined; and this Dominion, as we have seen, is a rather large country and only partly surveyed, in which case the geologist has to first survey and map out the region. Certain rocks are found in the locality under examination and the question arises as to their age or period of formation, that is, do they contain evidences of animal or plant life? The Paleontologist is the judge in this case, and according to the evidence produced is the verdict. It is, therefore, seen that the study of Paleontology is of the first and highest importance to arrive at the correct stratigraphical and economic value of the rocks discovered and of the district under examination. In the event of no organic remains being discovered, and for the determination of such minerals and ores as may occur, their chemical composition has to be ascertained. This is the duty of the Mineralogist or Chemist. Ores having been found the question arises: are they of commercial value and in quantity to warrant the district being classed as a mining location? The settlement of this question is the province of the mining engineer, whose duty ought to be, under proper mining regulations or laws, the examination and inspection of the region, with the end in view to the full development of the minerals it contains. The notes taken in the field being disjointed or un-

connected as it were, have to be put in form so as to make an intelligible continuous readable account of the physical features, strata, &c., of the district. The work already mentioned is printed and published, and so to speak, tells its own story, but the geologist has of necessity a value to the public which does not show in print; it is that of giving information or explanation in writing, or by interview, of the district so reported on as a natural outcome of that publicity, and is often not by any means the least important duty to perform, and one that occupies much time and for which due credit ought to be given.

The map or plan can serve the double purpose of recording strata and indicating the occurrence of such minerals or ores as are of economic importance or scientific interest, including building materials, fertilizers, ores, coal, gas, oil, and mineral products used in the arts and manufactures. It can thus be clearly seen how great is the importance of geological work to the prosperity and happiness of the inhabitants of any country.

The advanced condition of Canadian geology will bear comparison with that of other countries and is highly creditable to so young a country and one of so extensive an area, but the great progress made in the early years was wholly due to the philanthropic spirit and a devotion to the science carried on at much personal expenditure and labor by the late Sir Wm. E. Logan, in whose praise it is not possible to pay too high a tribute. Since Confederation the Dominion has undertaken the work for the several provinces, and it is to be regretted that economically and financially the Provinces of New Brunswick, Quebec and Ontario have not made the best use of the mineral resources of these provinces, while Nova Scotia and British Columbia have retained the minerals and are now and will continue to receive benefits and income for so sure a course.

The large extent of territory only suitable for mining under Dominion and Provincial Governments makes it obligatory on these Governments that the best laws be enacted to encourage pioneer or individual exploration or prospecting with the view of the full development of the mineral wealth, and to receive in return a revenue to compensate for geological survey which is the certain and permanent result of such work.

In the Australian colonies where this industry is not neglected as it is in Canada, a minister of mines is the representative of the important industry of mining when the laws are such as to develop to the best advantage this source of national wealth of which we have a sufficiency in Canada for home and exportation use.

Mayor Stewart and Mr. W. A. Allan of Ottawa have received the bronze medal of the Indian and Colonial Exhibition for exhibits of coal and phosphate and other minerals sent by them.

The Cost of a Strike.

There is considerable monotony in repeating, time after time the story of what a great strike costs those who engage in it; but the lesson is sufficiently valuable to warrant infinite repetition in hope of ultimate conviction. Here is the latest tale of the kind:—

It is calculated that the total losses in wages by the recent strikes among the "Longshoremen" and other working people in New York and New Jersey, from January 1 to February 10, are 2,650,000 dollars, while the estimated loss of pay by 38,000 employees thrown out of work through scarcity of coal, or cognate cause, is 350,000 dollars. In addition to these figures we have:—Total extra amount paid for coal through strikes, 700,000 dollars; total losses incurred by steamship companies through delay, 100,000 dollars; total losses to coal-shippers, 100,000; total estimated losses of the export trade of New York in two weeks, 3,380,000 dollars. Persons interested in promoting strikes nearer home than New York or New Jersey might profitably employ some of their leisure in calculating how much, if any, profit has accrued by way of counterpoise to these figures.

We have received the second volume of the Journal of the Iron and Steel Institute of London, England, for 1886. This valuable and ever welcome work is edited by Mr. J. S. Jeans, and is largely made up of the transactions of the Institute at the last meeting held at London in October last. It contains verbatim reports of the many valuable papers read before the society then. These were "The Erosion of Gun-Barrels by Powder Products," by Sir F. Abel, C.B., F.R.S., and Col. Maitland; "The Iron-making Resources of the Colonies, as illustrated by the Colonial and Indian Exhibition," by Mr. P. C. Gilchrist and Mr. Edward Riley; "Some early forms of Bessemer Converters," by Sir Henry Bessemer, F.R.S.; "Modifications of Bessemer Converters for small charges," by Mr. John Hardisty; "On Combustion with Special Reference to Practical Requirements," by Mr. Frederick Siemens; "The Removal of the Metalloids in the Basic Open-Hearth Process," by Mr. F. W. Harbord; "The Casting of Chains in Solid Steel," by M. F. Gautier; "The Process employed in casting brass chains in Jeypore, Rajputana," by Surgeon-Major T. H. Hendley and Mr. C. H. Purdon Clarke, C.E.; "On Silicon in Foundry Iron," by M. F. Gautier; "The Chemical composition and mechanical properties of Chrome Steel," by M. Brustlein; "American Blast Furnace Practice with special reference to the works of the North Chicago Rolling Mill Company," by Mr. F. W. Gordon. One of the most attractive features of the volume is the very carefully compiled "Notes on the Progress of the Home and Foreign Iron and Steel Industries" classified under the heads of iron ores, fuel, refractory materials, production of

pig iron, production of malleable iron, forge and mill machinery, production of steel, &c., &c. In these a vast amount of useful information is included. Altogether the publication is of great worth and interest.

Iron, Steel and Coal in Canada.

The development of the coal and iron industries of the Dominion of Canada is at the present time a duty imperative upon the Dominion Government. Since Confederation the Dominion has incurred a large national debt abroad on which interest only has been paid, and the burden has therefore been light upon the people. Otherwise, the country would never have been able to bear the strain imposed by the excess in value of imports over exports, which, to July 1st, 1884, amounted to \$342,036,663.

To meet this excess of expenditure abroad Canada had only the annual revenue from her mercantile shipping, and the balance is represented by the national debt held abroad and a portion of the foreign capital invested in this country. The greater part of this excess of imports over exports is also represented by the importations into Canada of iron and steel to the value of \$230,741,434 since 1867. It thus becomes apparent that if Canada is to prevent the possibility of commercial bankruptcy, she must produce at home the iron and steel which has hitherto been imported from abroad for home consumption. It was wise and prudent to increase the national debt by constructing vast and necessary public works throughout the Dominion, at a comparatively small annual interest charged to the people; but as soon as Canada would attempt to live within herself and make her annual exports pay for her imports, then must she undertake to produce her iron and steel at home, rather than depend upon foreign nations for her annual consumption. The best way to do this is the problem, to the solution of which the statesmen of Canada must at once address themselves.

We use the statistics for 1884, as we have them compiled to hand. In that year Canada had about 10,000 miles of railway in operation; or an investment in railroads of \$.04 per head of the inhabitants which was only exceeded by that of Great Britain averaging \$107 per head, and that of the United States averaging \$112 per head; and at the same time it must be remembered that there is no other country in the world, which has such investments in railroads as those of Canada, that does not manufacture its own rails; while on the other hand there is no country in the world which has in its possession such natural advantages for the manufacture of iron and steel as those of this same Dominion. Yet what do we find? Instead of manufacturing our rails, we have imported in one year rails to the value of \$5,891,861, and in the same year iron to the value of \$9,456,189, which, together with the imports of iron and steel manufactures, aggregated an importation for Canadian consumption in one year of \$26,791,152. The question for Canadians to answer is how long can Canada afford to do this, with iron, coal, limestone, etc. offering unsurpassed advantages for the production of iron and steel, and the manufactures thereof, lying useless and worthless at her feet. At the same time, we have not only lost a home market for the coal which would have been consumed in the production of this iron and steel, but we have imported from abroad nearly \$60,000,000 of coal and coke for home

consumption. Certainly these facts are startling indeed.

The average annual excess of imports over exports into Canada to 1867-83, was \$20,119,804; the average importation of iron and steel and the manufactures thereof was \$13,573,600. In order to compare this showing with that of the United States, we produce the following per capita statistics:—

Year.	Canada. cents.	United States. cents.
1867.....	-----	69.03
1868.....	204.47	61.21
1869.....	216.78	74.37
1870.....	224.89	84.26
1871.....	301.00	109.35
1872.....	454.85	130.26
1873.....	701.41	137.47
1874.....	577.16	80.99
1875.....	515.33	46.47
1876.....	345.76	28.40
1877.....	289.38	21.92
1878.....	240.38	17.77
1879.....	199.57	19.62
1880.....	248.88	90.66
1881.....	297.69	99.99
1882.....	404.63	102.27
1883.....	455.80	74.40
1884.....	332.26	-----

It will thus appear that while Canada has been importing iron and steel to the amount of \$7.01 per head in one year, the highest importation into the United States has only been \$1.37 per head. It is equally noteworthy that in Canada in the one year, the average rate of duty on the dutiable importation was 11.05 per cent; while in the United States in the other year the average rate on the dutiable importation was 31.81 per cent. The highest rate of duty levied in Canada in those seventeen years was 21.08 p.c., the lowest was 10.98 p.c. In the United States, the highest was 49.21 p.c.; the lowest was 31.46 p.c. These facts are suggestive as indicating that the United States have protected the home producers by tariffs ranging from 31 p.c. to 49 p.c., and have thereby encouraged home production and decreased the foreign importations. Canada has simply levied a revenue tariff ranging from 11 p.c. to 21 p.c. which has failed to encourage home production, while the country has sent \$230,741,434 (1867-83) out of the country to purchase these iron and steel products abroad.

No country in the world has developed its iron interests except by a policy of protection. England, United States, Germany, France, Russia, Sweden have all fostered this industry by special legislation. Canada has thus far done but little toward this end. About 20,000,000 tons of pig iron and 6,000,000 tons of steel are now annually produced, together with 400,000,000 tons of coal. With unsurpassed facilities for their production should Canada remain careless and indifferent?

From 1867 till 1880 pig iron was on the free list in Canada. What wonder that its production was not successfully attempted?

In 1880, a specific duty of \$2.00 per ton was levied; and from July 1st, 1883, to July 1st, 1886, a bounty of \$1.50 per ton was granted.

In the latter year the bounty was reduced to \$1.00.

The United States levy a duty of \$10.00 per ton on pig iron; and \$12.50 per ton on scrap iron. These are fair samples of the different policies of the two countries. Shall Canada continue to give a duty and a bounty, combined,

of \$3.00, or shall the duties be removed from raw sugars and other raw imports, and from \$10.00 to \$15.00 be levied on pig and scrap iron, for instance, in order to foster the iron industries at home?

PHOSPHATE.

Latest English Quotations.

MINERAL PHOSPHATES.—The business done in Canadian has been principally on Continental account, and this has been restricted by a demand on the part of the Raisers for an increased price, and also by their unwillingness to sell until their prospects of output are more assured. Last season the quantity was several thousand tons less than the previous year, and Raisers are now endeavouring not only to recover their shortage, but to swell the shipments during the approaching season. There is some enquiry for Ground Canadian, but as the American Buyers can pay a higher price for this article, there will probably be less shipped to this Market. South Carolina Phosphates are unchanged. The new French Phosphate increases in popularity, and must henceforth be considered as an element in the trade. Shippers are getting over their difficulties, and are now able to deliver with greater rapidity. Belgian Phosphate has been quiet since our last, Manufacturers mostly being stocked for their immediate requirements. The present appears to be a good time to secure next season's supplies. Latest price for Canadian eleven pence three farthings for 80 p.c. Cambridge and Bedford Coprolites are unchanged, and quoted at 43s. f.o.r., or Ground at 50s. in Buyer's bags, or 52s. in lent bags, f.o.r., the latter at 26s., f.o.r., or 31s. 6d., f.o.b., Thames.

The first Annual meeting of the shareholders of the Templeton and Blanche River Phosphate Mining Company (limited) was held at Montreal on the 31st ultimo. The following directors were elected:—President, Mr. Wm. Cassils; Vice-President, Mr. Honore Beaupre, ex-Mayor of Montreal; Sec.-Treasurer, Mr. Philip S. Ross.

Recent reports from the Buckingham district would seem to indicate that phosphate mining is moving northwards. Several hundreds of tons having lately been taken out of a mine on River du Suer, a tributary of the Du Lievre River, some forty miles above Buckingham. The mineral is said to be of excellent quality. It is hauled at present to the foot of the Long Rapids by sleighs, and as soon as the ice breaks up will be conveyed from that point to the village by scows.

Messrs. Poupere & Co., contractors, have completed their arrangements for the construction of the new stone lock and dam some 12 miles above Buckingham. The present advanced state of the phosphate industry has made the construction of these works an absolute necessity. The increased facilities for moving the ore now to be provided will reduce the cost of its transportation, and will enable miners to sell the ore at a lower figure than heretofore.

It is estimated that the output from the various mines in the Buckingham district for the season ending 1st May will be as follows: High Rock Mines about 6,000 tons; Union, about 5,000; North Star, 3,500; Little Rapids, 1,200; Emerald, 5,000; Anglo-Canadian, 1,000; Glasgow Phosphate Company, 500; McLaurin & Blackburn, 1,000; sundry smaller properties

about 300 tons. In all, it is thought, close in the vicinity of 25,000 tons will be mined. Of this quantity three-fourths will be high grade ore, averaging from 75% to 85%.

In view of the immediate opening of navigation, work on the various properties is being pushed vigorously forward. Additional hands are being employed, and new machinery operated by steam power is being largely adopted in preference to the old *modus operandi*.

Notwithstanding its very steep grade the tram line constructed on the High Rock property last season has proved most satisfactory, and at Little Rapids, the one now in course of construction, will be completed and in running order by the first week in June. We understand that the North Star and Emerald mines will shortly follow suit in the same direction.

The output from the High Rock mine for the month of March was the largest ever mined from any one phosphate property in the Dominion, and was as follows:—829 tons first quality, or all over 80%, and 39 tons of second quality which will yield over 70%. This was with an average of 135 men. This most gratifying result is in very large measure due to the superior mining plant at present in operation at this property. Nothing is done by hand that can be done by machinery, every particle of which is first-class.

The output from the Emerald mine for the same month figures close upon 500 tons with an average of 60 men.

It is understood that Mr. S. P. Franchot, the popular manager of the Ottawa Phosphate Mining Company, has recently acquired a half interest in 4 lots, formerly owned by Captain McNaughton at the High Falls, in the 10th Range of Portland, and that it is his intention to commence work early in the spring.

The shaft at the North Star is now down some 500 feet, and the management report a good show at the bottom. The output from this property and from the Union mine for the past month will be fully up to their ordinary monthly output.

At Little Rapids the output for March was 120 tons with an average of 21 men. This number of hands however includes woodchoppers, teamsters and other outside employees.

The Du Lievre Mining and Manufacturing Company are making extensive improvements on their property at Bassin du Lievre. A very large and powerful new water wheel is to be put in. Altogether the company will push for a large output from their mine.

We learn that the Glasgow Phosphate Company have suspended operations at their mine, pending the settlement of some difficulty between the management and the Scotch Board.

It is expected that navigation on the Lievre will be resumed about the 25th of the month. The steamers *Agnes*, *Eva* and *High Rock* have been in the stocks all winter, and have been fully prepared for the season's work.

California has produced in gold between 1843 and 1886, one billion, two hundred million dollars in coin value.

MINING NOTES.

Nova Scotia.

A decision of much importance to gold miners in the Maritime Provinces has just been made by Judge Smith, at Halifax, in an Appeal against the decision of the Commissioner of Public Works and mines for the Province of Nova Scotia, in which an application for a gold prospecting license was refused to two parties named Cameron and McLeod. McLeod's application was as follows:—

"Please find \$1.50 for a prospecting license of three areas described as follows: Beginning at a stake marked W. M. L., standing about one mile westerly from Malaga Lake, in the County of Queens, thence southerly 250 feet, thence easterly 450 feet thence northerly 250 feet, to the place of beginning, containing three areas."

Judge Smith in his verdict says:—

"I do not regard the decision appealed from as deciding any conflicting claims of parties applicant, as the Commissioner does not appear, as far as we can gather from the papers before us, to have granted a license to any one; but simply to have decided that the application of McLeod was not in accordance with the provisions of sections 16 and 39 of Chapter 7 of the Revised Statutes 'of Mines and Minerals.' On referring to these sections it certainly does appear to my mind that they were framed by the legislature for the purpose of preventing mistakes or misapprehensions, and to compel applicants for prospecting licenses clearly to define the exact locality of the area or areas upon the ground; at least, that, at the time the application was made, some definite stake or starting point should be given, from which the areas could be ascertained. The two sections referred to, and upon the provisions of which the Commissioner alleges that he based his decision, seem to be very clear. The 16th section says, 'every application shall be in writing, defining the area or areas applied for.' The 39th section refers especially to prospecting licenses, and provides that 'all applications for prospecting licenses shall accurately define by metes and bounds the lands applied for.' It can hardly, I think, be reasonably urged, that if it appears as it does in this case, that when the stake or spot indicated in the application as the starting point from which those metes and bounds are to be ascertained does not exist on the ground, the areas are accurately defined, as required by the express words of the statute. One cannot read the whole of the statute without perceiving how careful the Legislature was in striving to avoid difficulty or confusion with reference to the rights of applicants. It must be evident if the application of McLeod can be held to be such a valid one as would compel the Commissioner to grant him a license, the words I have designated requiring an accurate definition of the areas, may be struck out of the statute as being useless verbiage. If this application could be held to be a legal one, it would have been equally good if the application stated the areas to lie near Malaga Lake, and the party would only have to find some areas anywhere near the lake, put a stake down, and claim a prospecting license starting from that point, and which may cover an entirely different area than he first intended when he made his application. I think it would be contrary to the policy of the Legislature, and most unwise to uphold such a contention. Therefore, I think, the appeal should be dismissed with costs."

The iron, steel and coal interests of the Maritime Provinces are asking modifications in the tariff to further protect and develop them.

We are informed that Mr. George Forsythe, of Halifax, has purchased the gold mine at Cochrane Hill, Guysboro, formerly owned by Messrs. McKenzi, Archibald and Caffrey.

The old Hall-Anderson mine is now run by the Egerton Gold Mining Company. Work has been started on the McGilligan lead which is 2 feet thick.

New Brunswick.

Albertite, which was at one time worked somewhat extensively at the Albert mines, Albert County, was first discovered by accident about the year 1850. The vein which was worked out about six years ago occupied an irregular and nearly vertical fissure, and varied from 1 inch to 17 feet in thickness. It was mined to a depth of nearly 1,500 feet, gradually running out as it descended. This remarkable mineral, occurring in connection with calcareo-bituminous shales or pyrochists, has been regarded by some as true coal, by others as a variety of jet and by others again as more nearly related to asphaltum. It resembles the latter closely in appearance, being very black, brittle and lustrous, with a broad conchoidal fracture, and like asphaltum is destitute of structure, but differs in fusibility and in its relation to various solvents. It differs from true coal in being of one quality throughout, in containing no traces of vegetable tissues, and in its mode of occurrence, which is that of a vein and not of a bed. It is estimated that the total amount of albertite raised was not far from 200,000 tons, the price of which varied at different times from \$15 to \$20 per ton. It was principally used for admixture with ordinary bituminous coal in the preparation of illuminating gas. For this purpose it was admirably adapted, yielding per ton 100 gallons of crude oil or 14,500 cubic feet of gas of superior illuminating power.

Satisfactory reports continue to be received from the Manganese districts.

Quebec.

A meeting of the Anglo-Canadian Asbestos Company was held at Montreal on Monday the 14th inst., but all information as to what transpired has been refused by the company.

We understand that signs of vigorous activity once more prevail at the British Iron mines. Furnaces for the smelting of the ore are presently in course of erection, and when completed it is estimated that steady employment will be found for a large number of men. It is also currently reported the management contemplate the erection of a tramway from the mines to the Ottawa River. This will be operated by horsepower and will greatly facilitate the transportation of the ore from the mines to the Canadian Pacific Railway.

A new shaft is to be sunk on the St. Onge gold mining company's property. The find of gold during the winter has been sufficiently encouraging to the proprietors to stimulate their search higher up on the river bed. Some of the gold taken out is very large and nuggets weighing from 1 dw't to 1½ ozs have been found.

There is very little doing as yet at the Asbestos Mines. Within the last few days the Thetford people have put on some men to clean up and shovel out snow from the open cuts, and they anticipate starting mining operations in a week or two.

At the Anglo-Canadian Asbestos Company's mines about 25 men are presently at work, and the daily output is about two tons per day. In a week or two the hands will be increased and operations pushed vigorously. The machinery and drills at these mines continue to give every satisfaction to the management.

It is anticipated that this season the output of asbestos at the various mines will be somewhat in excess of that of last year. There are indications of an increased demand and prices remain steady. An advance on last year's figures is predicted. Miners report that they have already sold considerable quantities of their prospective output for the ensuing season.

Development work is being vigorously pursued on the property of the Vileueve Mica and Mining Company near Buckingham. Machinery of the latest and most approved pattern is in operation and the deposit which is of the purest and clearest Muscovite is apparently unlimited in extent. Six good strong veins are to be found on the side of the hill. The value of this property with its many fine buildings and improved machinery is inestimable.

Ontario.

The Anglo-American Iron Company which owns about 200,000 acres in the County of Hastings, largely mineral land, and by whom it will be remembered the Central Ontario Railroad, running some 100 miles northward from Lake Ontario, was constructed, has decided to extend the Road north-westward from Coe Hill for a distance of 150 miles until it meets the C.P.R. at North Bay. The country thus to be opened up is said to contain large deposits of Bessemer ore and to be well timbered.

The Syndicate which is largely composed of Canadian and American capitalists has an authorised capital of \$10,000,000. \$5,000,000 of which is for the railroad. The ore already taken from the principal mine at Coe Hill has not proved altogether satisfactory, being too high in sulphur and requiring to be calcined before using, with the result that shipments from Weller's Bay last year were very much reduced. The work of construction of the new line will be commenced early next month, and will be pushed through to completion.

A local exchange announces that Mr. Martin Conroy, of Sudbury Point, owner of one of the copper mines to the north of that village, is negotiating the sale of his interest in the mine to Mr. Richey, of New York, for the sum of \$20,000. The property, which is some six miles north of Sudbury, was discovered last fall.

Mr. Richey has now a gang of about 70 men busily engaged in excavating copper ore out of mines purchased some time ago, and has immense quantities on the ground ready for a crusher which he is importing.

The Royal Society of Canada have submitted a memorial to Sir John Macdonald praying for the consideration of increased museum facilities at Ottawa. Prof. R. Bell states that the number of papers already promised for the Society's Annual Conference in May is largely in excess of former years.

The Kingston and Pembroke Iron Mining Company has been organized, with a capital of \$5,000,000, for the purpose of developing the iron ore district on the line of the Kingston & Pembroke Railway Company. The company owns 8,000 acres of mineral land between Kingston and Renfrew. It has three mines in active operation, and other openings will be made within a short time. Henry Siebert is President of the company, and among the principal stockholders are Samuel Thomas, Calvin S. Brice, J. O. Moss, Alexander J. Smith, H. H. Porter, R. R. Cable, S. P.

Flower, H. H. Hollister, James Tillinghast, George A. Kirkpatrick and Charles F. Gldersleeve, of Kingston; William Polluck, of Cleveland, and John S. George, of Milwaukee. The entire amount of stock has been subscribed, but the formal organization will not be announced until the company has been chartered at Kingston under the Canadian law.

The C. C. Mining Company have introduced into its works at the Cliff, and also at the Stobie mine, machinery worked by steam for the purpose of extracting the ore.

The silver mines on the Sturgeon river in Nipissing district, are attracting considerable attention among mining speculators as spring approaches. James Holditch, Esq., the owner of the Temogawing Mine has employed James McAvoy, P.L.S., to proceed with his staff to execute survey and plan. Mr. Walter Cockburn will probably take steps to develop his mine at Cross Lake as soon as the snow disappears.

PORT ARTHUR DISTRICT.

Work has been resumed at the Silver Creek Mine.

The *Miner* states that there are persistent rumours that Silver Islet will be once more placed in operation in the course of a few weeks, but they cannot be traced to any reliable source.

The Heron Bay Mine will be worked as soon as the spring opens.

We learn that Mr. B. W. Harris, for some time editor of the *Miner*, has been compelled to sever his connection with the paper through pressure of other work.

Operations are to be immediately resumed at the Huronian mine, and new machinery has been shipped from New York and Chicago. It is expected that the mill will commence work about the 1st of May. Chlorination works are to be erected during the summer.

The proprietors of R.51, situated near Silver Mountain, Messrs. P. M. French, W. C. Dobie and others, have announced their intention of driving an adit level on their property during the summer and putting it in a proper state of development to ascertain the value of the location.

Manitoba and North-West Territories.

A meeting of the Board of Directors of the Canadian Anthracite Coal Company was held at St. Paul on the 31st ulto. It was reported that as soon as work on the pockets at the mines was completed a commencement would be made with the shipment of coal for the season. 1,500 tons will be shipped to San Francisco at an early date. It is proposed to increase the number of men, and during the summer it is expected that between two and three hundred men will find employment at the mines.

At Anthracite Station the Canadian Pacific Railway have constructed a new siding for the company, a post-office has been established, and a large number of new buildings have been erected. The Annual general meeting of shareholders will be held at Banff in August.

British Columbia.

A new Hydraulic Mining Company has been started on the Fraser River about eleven miles above Lillooet, called the Fraser River Cable Mining Company. The system they intend working it on is new in this part of the country. They take the water out of the creeks by means of hose or pipes suspended from a cable stretched across the river.

At a general meeting of the shareholders of the Quesnelle Quartz Mining Company, held on the 10th ult., Messrs. James Reid, R. J. Skinner, Joseph Mason, J. F. Hawks, W. A. Johnston, George E. Filmore and William Morrison were elected directors. The secretary and manager's reports were very satisfactory. Several vein specimens of quartz taken from the shaft were shewn by the president at the meeting.

The Big Bend region is practically unprospected, but the mineral claims recorded, lie for the most part, around the headwaters of McCulloch and French Creeks. The numerous gulches and ravines generally run in an easterly and westerly direction and have cut the ore in the belt often at right angles. In other places there are outcrops on the hillsides. Specimens from both these occurring ores have proved to be rich; some show gold to the eye. Most of the ore seems to be auriferous milling ore, but whether it will preserve that character when sunk into or turn to less tractable ore, or, as some conjecture, to silver bearing ore of some kind, possibly argentiferous galena, cannot be stated at present. Nor is it known, of course, yet, how many, or whether any, of these recorded mineral claims are veins of a kind and quality that would pay for working. Very remarkable results are obtained in this business from the improved methods of modern days. For instance, it is found that in the colony of Victoria, Australia, crushing auriferous quartz pays if it contains as much as 5dwts. of free gold per ton—that is of gold not associated with pyrites. When it is associated with the less tractable forms of pyrites $1\frac{1}{2}$ oz. to 3 oz. are required; but speaking broadly Victoria has made its fortune out of gold deposits which yield on an average less than *half an ounce* a ton.

There are apparently mineral veins at Big Bend; small parcels have assayed from \$50 to \$150 a ton; the mining region is near a great navigable river crossed by the Canadian Pacific Railway; the climate is not severe; there are arable and hay lands and three months summer hill pasture, also abundance of wood. With a steamer on the Columbia the mines would be within two days' reach of the above railway. Under these circumstances, every effort should be made to ascertain the true character of the ores and the size of the mineral veins in a district in which all mining conditions are so good.

The following is a copy of an assay of ores from a group of veins at the Ille-cille-waet section, made by an American capitalist, who proposes to return in the spring:—

No. 1.....	\$126.25	Silver per ton.
" 2.....	175.82	" "
" 3.....	31.05	" "
" 4.....	50.00	" "
" 5.....	84.08	" "
" 6.....	60.80	" "
" 7.....	59.00	" "
" 8.....	609.00	" "
" 9.....	41.68	" "
" 10.....	384.77	" "

Mr. F. Jones, Gold Commissioner at Clinton, estimates the gold yield taken from the Lillooet district during the past year thus:—

A. W. Smith.....	\$57,900
F. W. Foster.....	16,517
E. Bell.....	13,700
All other sources.....	43,883

\$132,000

Work is to be immediately resumed at the Foster Quartz mine. The mill is now completed and a number of experienced miners from California have gone to the scene of operations.

The Big Slide mines which comprise the properties of this company were discovered through the enterprise of Mr. F. W. Foster, of Clinton. A piece of heavy sulphuret ore was given him by an Indian, in 1872, which assayed \$28.50. Mr. Foster sent an old miner to try and find the ledge and locate it; this he was successful in doing; work was begun, and tunnels run to tap the ledge. In the lower tunnel this was done at a distance of 243 feet, and in the upper tunnel at 80 feet, at each point of contact a strong ledge of good quality was found. Mr. Chenhall, a practical Cornish miner, erected an arrastra, with which to work the ore; it was not built correctly and the limited supply of quicksilver was lost. 900 pounds of the ore were crushed at this time, the small portion of remaining quicksilver and amalgam yielded in gold \$12.50, and a prospect could be got of the tailings nearly as good as before milling.

Of the work done during the past year, Mr. Geo. Henderson, the Superintendent of the Company, writes:—"During the past summer I put a few men to work taking out ore for shipment to San Francisco for treatment to determine the value and best modes of working. The tests made in San Francisco were deemed sufficiently encouraging to organize a company and go to work in earnest. The approach to the mine being very difficult, a large outlay of money was necessary to build a road, over which to haul machinery, &c. This road is now completed, and the machinery for a modern ten stamp gold mill and corination works are now on the ground; by the new year, if no unforeseen delays occur, the mill will be erected and running. The mines are now being opened up for permanent work. The levels are being connected by upraises to insure a good circulation. Drifts are being driven on each level. In all parts of the mine so far worked, fine paying ore has been found, which improves as the mountain is pierced. Everything gives promise of an immense body of ore. The main vein is from 15 inches to 5 feet in width. The average value per ton is about \$20 gold and \$2.50 silver. By the method of reducing that will be used, 90% of the gold and silver in the ore will be saved, at a cost of mining and milling of about \$5 per ton. Work goes on in the mine day and night, and by the time the mill is ready, the mine will be sufficiently opened to furnish all the ore necessary to keep the mill constantly at work. It is the intention of the company to enlarge the mill as soon in the spring as possible—the grading for the additional stamps is completed. Two desulphurizing furnaces are now in course of construction. There are on the pay roll of the company fifty men, employed as miners, carpenters, and men employed at the saw-mill. We have burnt a kiln of 67,000 brick; they are of a very fair quality, and will be used in the construction of our furnaces, &c."

The Canadian Anthracite Coal Co.

LIMITED.

Miners & Shippers of Coal.

McLEOD STEWART, Pres., J. G. THROP, Vice-Prest.
OTTAWA, CANADA. EAU CLAIRE, WIS.
A. PUGH, General Manager, W. B. SCARTH, Secretary,
ST. PAUL, MINN. WINNIPEG, MAN.
O. H. INGRAM, Treasurer,
EAU CLAIRE, WIS.

Mines at Anthracite,

N. W. T., CANADA. V-I-1Y

Personal.

Mr. R. W. Ellis, M.A., of the Geological and Natural History Survey, has been granted the L.L.D. degree by the corporation of the university of McGill. Ever since his graduation as a Bachelor of Arts at the same university when he carried off the Logan gold medal, Mr. Ellis has been actively and successfully engaged in Geological work in Canada, so that not only is the honour which has been conferred upon him by that university a deserved one, but one which makes a crowning point in the successful issue of his arduous labours in developing so important a branch of research in the country. The subject of Dr. Ellis' thesis to the corporation was "The History of the Geology of New Brunswick," a subject which his long experience in that section of the Dominion eminently fitted him to handle in a masterly manner. We extend to Dr. Ellis our hearty congratulations.

Professor Macoun, of the Geological and Natural History Survey staff, has gone to British Columbia, where he will be located during the summer.

Mr. C. B. Wright and other gentlemen interested in the establishment of smelting works, in connection with the mines in British Columbia, have had an interview with the Customs Department at Ottawa. They want admission free of duty of the peculiarly constructed machinery required for this purpose in the Province. The works are to be erected in the Selkirk range and other parts of British Columbia, which are rich in minerals.

CHESTNUT.

[Iron Trade Review.]

We observe an article now going the rounds of the papers regarding "A Cat on a Fly-wheel." This time the venturesome feline is located in an electric lighting station at Brooklyn. Isn't it about time to give poor Tom a rest? With only slight changes as to locality and circumstances the same item has been a staple article for clipping for the past ten years or more. One week, in Cincinnati, he travels 300 miles at the rate of 45 miles an hour and drops off in a limp and sell-me-out-for-five-cents condition; the next week finds him in Chicago, clinging for ten hours to the rim of the wheel and then hopping off at night as chipper as ever; anon he gets a free ride in Detroit and, when attempting to take a leap for life, strews the engine floor with yowls and violin strings; next he turns up in Denver with a sore throat and watery eyes, ready to go to sleep on the rim of the first fly-wheel that offers. If this thing doesn't stop, we shall next hear of his taking a trip from New York to Chicago on the drive-wheel of a locomotive and yet surviving to tell an admiring feline audience of his wonderful achievement.

Mineralogy, Geology & Science.

All correspondence under this head, and scientific exchanges, must be addressed to the Science Editor, Canadian Mining Review.

Omitted.

Through the unfortunate illness of Professor Marsan we are unable this month to furnish our readers with the concluding portion of that gentleman's paper on "The Chemical Aspect of the Metallic Minerals." We hope to do so in our next issue.

The Great Ice Age and Subsequent Formations at Ottawa, Ontario.

By H. M. Ami.

Of the Ottawa Field Naturalists' Club.

Among the most interesting and captivating subjects which attract the attention of even a casual observer in the realms of geological science, few of them are as full of interest and afford as much information as the researches in the most recently deposited or newer overlying strata. Besides this interest, there is carried with it the fact of its practical importance, so that the economic aspects of the question have likewise to be taken into consideration.

They are numerous, the questions which press themselves one upon the other in examining the *marls, sands, gravels, clays, boulders and kindred materials* of a district, and as this region which it is the province of the O. F. N. C. to examine, is particularly rich both in the extent and the distribution of such materials as have just been enumerated, the questions arising out of these Post-Tertiary deposits are themselves likewise rich in diversity, and scope. The following are some of the more important of these which we will attempt to consider and which naturally present themselves to one's mind:—

I. *At what period in the Earth's History did the Glacial Epoch or the Great Ice Age make its appearance?*

II. *What were the causes which led to this extensive reduction in the temperature?*

III. *What features characterized it and how long did it last? What, the phenomena of glaciation?*

IV. *What traces did it leave behind?*

V. *What was the condition of things subsequent to this epoch?*

VI. *To what extent was the continent submerged?*

VII. *For what period of time did this subsidence last?*

VIII. *What features characterized this period of submergence?—(marine life, etc.)*

IX. *What are the unquestionable proofs of the subsidence which was followed by a period of elevation? Besides these,*

X. *It will likewise be necessary to consider this period of elevation which carries us on to the present day, during which time numerous and varied lacustrine or aluvial deposits were laid, and in the lapse of which, man—aboriginal man—made his appearance; and, the questions which press themselves round this last point are exceedingly numerous indeed, and would of themselves form a worthy theme for a voluminous work.*

XI. Then, in which of the newer deposits are these traces of the existence of certain tribes of the American Indians found? What are these traces? To what extent do they assist in forming an estimate of the degree of civilization to which these aborigines attained? What customs, manners and modes of life are exemplified by the implements of various kinds found in what has been very appropriately termed in various countries the *Human Period*? At what time and how long did these inhabitants occupy the land before the intrusion by the whites, the causes which led to their disappearance in certain portions of the country and what was their history? *All these*, are only a few of the more salient problems suggested, and to which reference will be made.

* * * * *

But before entering upon these fascinating studies it may not be thought amiss to note what has already been done in the particular field of research with which we have to deal. In the "Geology of Canada," 1863, a report by Sir Wm. Logan and staff—there is incorporated in that admirable work a lengthy chapter on "superficial geology" in which a number of interesting notes are recorded from Ottawa and its environs, an examination of which had been entrusted to Dr. R. Bell. Then comes the work done in the Post-Pliocene geology of Ottawa by Dr. J. A. Grant which produced a number of valuable papers, some of which were published in the United States and others here in Canada. At the mouth of and along *Green's Creek*, but six miles distant from the city, and a favourite resort for students of Post-Tertiary geology, not only has Dr. Grant, but Sir William Dawson himself also has investigated and reported important discoveries. The collections of the late Dr. E. Van Cortland show that he too, devoted considerable attention to these interesting deposits, whilst the late Mr. E. Billings in his Canadian "Naturalist and Geologist" published notes on the same subject, in that valuable record of science. The above mentioned work and workers have been previous to the inauguration of the Field Naturalists Club in this city, and since its organization we have no hesitation in saying that it has been instrumental in carrying on successful excursions and sub-excursions over the district. Nearly a score of members, have at least taken a more or less active part in these researches, whilst the abundance of work and material at hand likely to be there for years and years of close examination—make it all probable that greater attention will continue to be paid to the deposits in question. The work done already is considerable; the work that is being done is not great, whilst there remains a hundred-fold more to do than has been done up to date. As many are well aware, our worthy "City Engineer" Surtees has been carrying on an extensive series of excavations in all parts of the city, from Sandy Hill to Ashburnham Hill, and from Stewarton to the Ottawa River, on one side, or from Sandy Hill to the Ottawa and Rideau Rivers on the other side of the canal, and that for the past two years. These excavations or trenches are dug or blasted out to a depth ranging from *eleven feet to eighteen feet six inches*, so that not only have deep but also interesting sections been afforded the writer and others, exhibiting the different kinds of strata and the material which compose them together with the fossil remains which occur entombed in the same.

Now, to begin with the description of these Post-Tertiary or Post-Pliocene (Pleistocene) deposits in this part of the country, as in any other portion, it is first necessary to ascertain,

whence the material came which composes them, and in order to do this it is obviously necessary to examine the older rocks of the district, see of what nature of rock their measures consist, and know the stratigraphical relations existing between the various members of these older underlying series.

Just as we have a great diversity of formations about Ottawa, so also have we a great diversity of substances in the material which makeup the rock of the Post-Tertiary deposits, (and let it be borne in mind, that in using the word "rock" it is used in its true geological sense, so that a handful of sand, a lump of clay, a mass of boulders, cemented or not by finer detritus, are all as much "rock" as a pillar of freestone, a block of limestone or a column of granite). Most of the materials which are found in these newer deposits were derived from the older formations of the district, whilst erratic blocks, and the like, may have come from great distances. To go into details as to what are all the various kinds of rocks met, would necessitate a long and protracted study of a great quantity of material which would form the constituent elements of all the formations from the *Laurentian* to the *Hudson River* as they are developed in the "Ottawa Basin;" from the gneissoid, granitic and hornblende rocks of the former, to the shaly magnesian and arenaceous measures of the latter. There would be included: the crystalline limestones, serpentines, dolomites and diorites of the *Middle Laurentian*, occurring at Chelsea in the Laurentide Hills, there would also be included portions of the conglomerates and quartzites and calc-bearing sandrock materials peculiar to the unconformably overlying *Potsdam* and *Calceiferous formations*, whilst the sandstones, shales and limestones of the *Chazy* followed upwards without a break by the impure calcareous strata of the *Black River* and *Trenton formations* would all be mixed together with the likewise conformably overlying bituminous schists of the *Utica*.

The materials which compose the series of formations just mentioned and newer than the *Laurentian* were themselves derived from the *Laurentian System*, for this latter contains all the elements necessary for the formation of the *sandstone, shales and limestones* of the newer overlying Cambro-Silurian strata.

Having thus ascertained the series of strata whence the material was obtained which constitutes the various beds or divisions of the strata in the Post Tertiary deposits, let us consider the condition of affairs previous to and at the coming in of the Glacial Epoch.

(To be Continued.)

The Yukon Country.

Interesting Sketch of Previous Surveys.—The Mineral Resources of that Vast Canadian Inheritance in the Extreme North-West.

Until the United States of America acquired that western portion of this continent, known as Alaska, its topography, to a great extent, had been neglected, except along its shore lines, and for a short distance inland in some places; the Yukon River Valley being the only portion of the country known, and that only imperfectly. Alaska at that time was to the outside world a veritable *terra incognita*. Simultaneously with the descent of the Imperial Eagle of Russia and the hoisting of the Stars and Stripes at Sitka, in 1867, was the idea of exploring

that "land of the midnight sun" promulgated. Many will remember the long and fierce debates, both in the Senate and Congress, upon the wisdom of paying to Russia the sum of \$7,200,000 for that north land. The opponents of the purchase characterised the country as a "useless pile of mountains and glaciers which possibly might, at some future day, supply the United States with ice quarries." However, that far seeing statesman, Secretary Seward, secured for Uncle Sam that valuable tract of country, which, from its position, ought to belong to the Dominion of Canada, and by many termed "Seward's folly." There are living to-day some of his brother legislators who are ready to acknowledge that, at least, there was "wisdom in his madness." Take, for instance, into consideration the acquisition of the valuable sealing grounds leased from the Government by the Alaska Commercial Company for \$350,000 per annum, a sum sufficient to pay interest and contribute towards the Government of the territory. Then again there is valuable mining interests being developed. At present one of the largest and most complete quartz mills to be found on the continent is there in successful operation—both mechanically and financially. And it is gratifying to the inhabitants of that new country to be able to point to developments which prove that there is scope for many more.

Although many exploring parties have, from time to time, been fitted out and sent by the United States Government, yet but little of a valuable character had been collected up to the time that "the special agent," Ivan Petroff, made his report in August, 1882. That gentleman has given a deal of information in regard to Alaska and its people. But when we take into consideration the extent of country drained by the great Yukon, it can be at once understood that one or two parties can do but little in a year or so in the way of giving the public a correct topographical description of that far distant country. Since Petroff's time Lieut. Schwatka and latterly Lieut. Stoney have done much, coupled with the expeditions under them, to furnish desired information. These travelers and explorers have received from private sources,—gentlemen, resident in the interior of the country for a number of years—much detail of a valuable and practical nature.

A few traders have established a trading post at the confluence of the Stewart and Yukon which they have named Fort Nelson. No doubt the advent of quite a number of miners, and the amount of gold which they were obtaining from the bars on the Stewart River induced the establishment of this trading post, which is about 70 miles east from the Alaska boundary. In order that the reader may better understand the relative positions and distances of points of importance along the mighty drainage artery, flowing at least 1,000 miles in British Territory, thence 1,600 miles through Alaska, width in places of 20 miles, embouching by a number of mouths into Norton Sound, a part of Behring Sea. As few facts regarding its mightiness may be mentioned. It has been stated, and it may appear incredible to those who have been taught to believe that the Mississippi is the father of waters, to be told that the Yukon River discharges every hour one-third more water than rolls by New Orleans during the same time. Strange as it may appear sea going vessels cannot get nearer the mouth of the river than some 50 miles, on account of the immense quantities of silt carried down by the freshets. The port of St. Michael, situated some 60 miles north from the river, is the depot for the Yukon River and

Arctic Trade, and is visited by the Alaska Commercial Company's steamers two or three times during the summer. At this point the company's river steamer loads cargo for the interior, taking on board 40 axe men to cut fuel on the trip up, whose mission it is, as soon as the steamer touches the bank, to rush, axe in hand, to the nearest drift pile, so that the craft may be detained as short a time as possible. Reaching Fort Yukon, a distance of about 1,200 miles from Saint Michael, in 22 or 23 days, and Fort Reliance, 400 miles further up the stream, in 6 or 8 days more, makes the length of the average trip 30 days. Notwithstanding the number of hands employed, and the length of time occupied in delivering goods at Fort Reliance, the freight rate charged is remarkably low, viz.: \$80 per ton, so that Harper & Co. are supplying provisions to the miners at Fort Nelson at a very reasonable price. There are about 70 wintering at and near that point at present. Last fall flour was sold at \$14 per 100 lbs., bacon at 30 cents per lb. and other staples in proportion. By the aid of a small steamer, which Harper & Co. bought from Schefflin Bros., who took it from San Francisco to Yukon for the purpose of using it in prospecting for gold, the owners are thus enabled to distribute and furnish supplies to miners at considerable distances from their depot.

It is scarcely creditable to our Federal and Provincial Governments to have to depend upon the exploration pushed forward by a foreign power to obtain information of one's own country; but so it is. It may be asked what is the country good for if explored tomorrow and a topographical description published? Commencing some six years ago a small stream of gold hunters flowed into the north-west portion of the Yukon country, and every summer since miners have visited it in search of the precious metal with more or less success. During the early part of last spring and summer over 200 miners purchased supplies in Alaska and went by way of Chilkoot to different streams where gold had been discovered, but principally to the Stewart River where the best pay had been found. For a portion of last summer Harper & Co.'s steamer, *New Rackett*, was used in raising water for a mining claim situated on this stream, and although tailings were being worked a third time, by the aid of sluices over \$20 per day to the hand for all employed was the result up to the end of the season. Others were mining on the Salmon below Lake Lebarge, while it is reported that on the Lewis River there were but few blanks drawn in that camp during last season. Some 70 men took up winter quarters at Fort Nelson and Stewart River, expecting to take out gold in the fall and early spring. The writer was informed by several gentlemen who had examined a very large bar of about four miles in length, some 30 feet deep and of considerable width, that it prospected throughout the whole gravel from 1 to 5 cents to the pan. This bar is on the main Yukon below the mouth of Stewart River, but the difficulty of working is the lack of water. That necessary agent can be obtained some 25 miles distant at a large outlay, but as wood is plentiful it might be less expensive to employ steam power to raise the required water. At any rate it is agreed that there is a big thing in the bar if water was only brought upon it. It is said that there are many other bars that prospect well, and that at no distant date will be worked profitably. It is believed that inside of the next two years over 1,000 men will be mining and doing well on White River. A great mining future is predicted for this great unknown land.

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Mining Regulations

TO GOVERN THE DISPOSAL OF

Mineral Lands other than Coal Lands,

1886.

THESE REGULATIONS shall be applicable to all Dominion Lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, iron or other mineral deposits of economic value, with the exception of coal.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein either by surface or subterranean prospecting for mineral deposits, with a view to obtaining under the Regulations a mining location for the same, but no mining location or mining claim shall be granted until the discovery of the vein, lode or deposit of mineral or metal within the limits of the location or claim.

QUARTZ MINING.

A location for mining, except for iron on veins, lodes or ledges of quartz or other rock in place shall not exceed forty acres in area. Its length shall not be more than three times its breadth and its surface boundary shall be four straight lines, the opposite sides of which shall be parallel, except where prior locations would prevent, in which case it may be of such a shape as may be approved of by the Superintendent of Mining.

Any person having discovered a mineral deposit may obtain a mining location therefor, in the manner set forth in the Regulations which provides for the character of the survey and the marks necessary to designate the location on the ground.

When the location has been marked conformably to the requirements of the Regulations, the claimant shall within sixty days thereafter, file with the local agent in the Dominion Land Office for the district in which the location is situated, a declaration or oath setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as afore-said; and shall, along with such declaration, pay to the said agent an entry fee of FIVE DOLLARS. The agent's receipt for such fee will be the claimant's authority to enter into possession of the location applied for.

At any time before the expiration of FIVE years from the date of his obtaining the agent's receipt it shall be open to the claimant to purchase the location on filing with the local agent proof that he has expended not less than FIVE HUNDRED DOLLARS in actual mining operations on the same; but the claimant is required, before the expiration of each of the five years, to prove that he has performed not less than ONE HUNDRED DOLLARS' worth of labor during the year in the actual development of his claim, and at the same time obtain a renewal of his location receipt, for which he is required to pay a fee of FIVE DOLLARS.

The price to be paid for a mining location shall be at the rate of FIVE DOLLARS PER ACRE, cash, and the sum of FIFTY DOLLARS extra for the survey of the same.

No more than one mining location shall be granted to any individual claimant upon the same lode or vein.

IRON.

The Minister of the Interior may grant a location for the mining of iron, not exceeding 160 acres in area which shall be bounded by north and south and east and west lines astronomically, and its breadth shall equal its length. Provided that should a person making an application purporting to be for the purpose of

mining iron thus obtain, whether in good faith or fraudulently, possession of a valuable mineral deposit other than iron, his right in such deposit shall be restricted to the area prescribed by the Regulations for other minerals, and the rest of the location shall revert to the Crown for such disposition as the Minister may direct.

The regulations also provide for the manner in which land may be acquired for milling purposes, reduction works or other works incidental to mining operations.

Locations taken up prior to this date may, until the 1st of August, 1886, be re-marked and re-entered in conformity with the Regulations without payment of new fees in cases where no existing interests would thereby be prejudicially affected.

PLACER MINING.

The Regulations laid down in respect to quartz mining shall be applicable to placer mining as far as they relate to entries, entry fees, assignments, marking of localities, agents' receipts, and generally where they can be applied.

The nature and size of placer mining claims are provided for in the Regulations, including bar, dry, bench creek or bill diggings, and the RIGHTS AND DUTIES OF MINERS are fully set forth.

The Regulations apply also to

BED-ROCK FLUMES, DRAINAGE OF MINES AND DITCHES.

The GENERAL PROVISIONS of the Regulations include the interpretation of expressions used therein; how disputes shall be heard and adjudicated upon; under what circumstances miners shall be entitled to absent themselves from their locations or diggings, etc., etc.

THE SCHEDULE OF MINING REGULATIONS

Contains the forms to be observed in the drawing up of all documents such as:— "Application and affidavit of discoverer of quartz mine." "Receipt for fee paid by applicant for mining location." "Receipt for fee on extension of time for purchase of a mining location." "Patent of a mining location." "Certificate of the assignment of a mining location." "Application for grant for placer mining and affidavit of applicant." "Grant for placer mining." "Certificate of the assignment of a placer mining claim." "Grant to a bed rock flume company." "Grant for drainage." "Grant of right to divert water and construct ditches."

Since the publication, in 1884, of the Mining Regulations to govern the disposal of Dominion Mineral Lands the same have been carefully and thoroughly revised with a view to ensure ample protection to the public interests, and at the same time to encourage the prospector and miner in order that the mineral resources may be made valuable by development.

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A. M. BURGESS,

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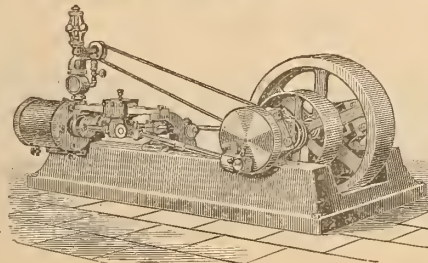
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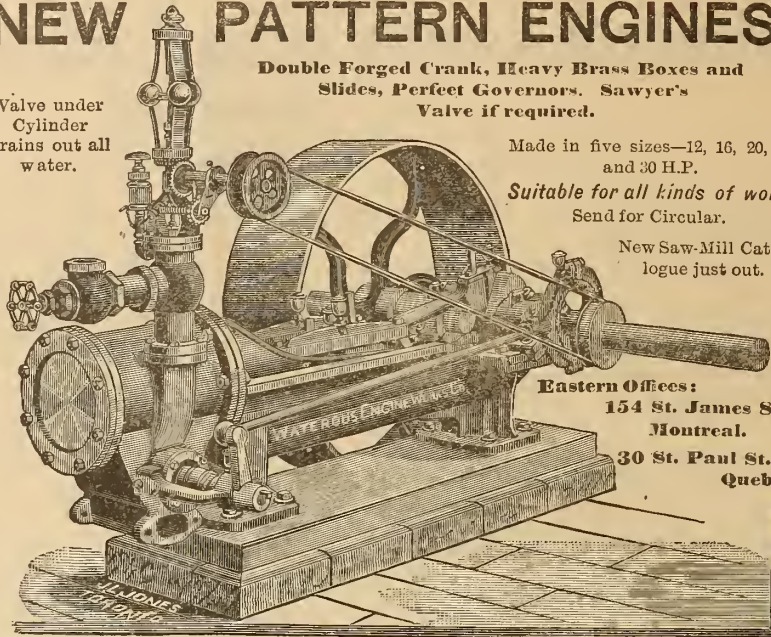
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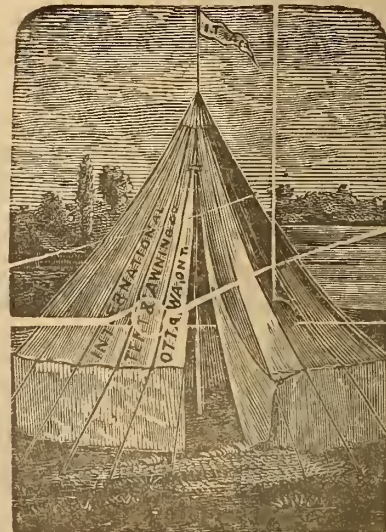
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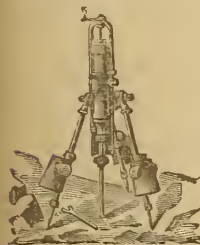
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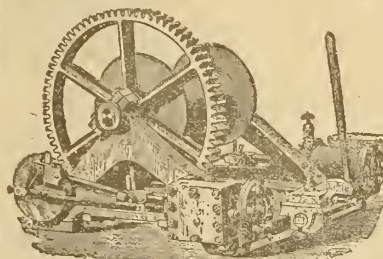
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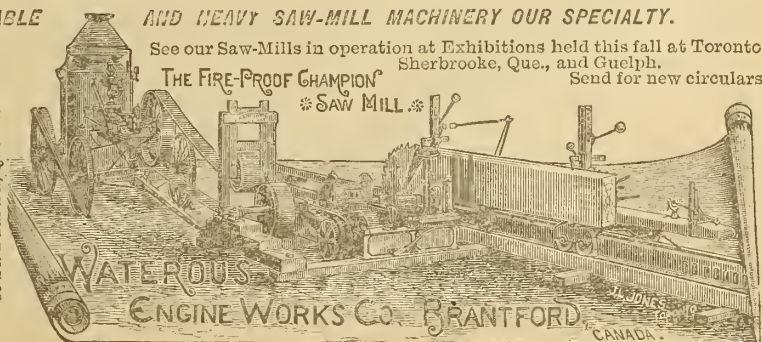
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The Department will not be bound to accept the lowest or any tender.

By order, **A. GOBEIL,**
Secretary.

Department of Public Works, }
Ottawa, 25th April, 1887. }



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Intending contractors should personally visit the site and make themselves fully cognizant of the work to be done, according to the said plans and specifications, before putting in their tenders.

Persons tendering are further notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque made payable to the order of the Honourable the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party decline to enter into a contract when called upon to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

By order, **A. GOBEIL,**
Secretary.

Department of Public Works, }
Ottawa, 25th April, 1887. }

NEW YORK

Metallurgical Works

104 Washington St., N.Y.

E. N. RIOTTE, - - Manager.

Ores Sampled, Working Test by any Process, Assays, Analyses of Ores, Mineral Waters and Products, Mines Examined and Mills Started.



TENDERS.

SEALED TENDERS, marked "For Mounted Police Provisions and Light Supplies," and addressed to the Honourable the President of the Privy Council, Ottawa, will be received up to noon on Monday, May 30th, 1887.

Printed forms of tenders, containing full information as to the articles and approximate quantities required, may be had on application at any of the Mounted Police Posts in the North-West, or at the office of the undersigned.

No tender will be received unless made on such printed forms.

The lowest or any tender not necessarily accepted.

Each tender must be accompanied by an accepted Canadian bank cheque for an amount equal to ten per cent. of the total value of the articles tendered for, which will be forfeited if the party declines to enter into a contract when called upon to do so, or if he fails to complete the service contracted for. If the tender be not accepted the cheque will be returned.

No payment will be made to newspapers inserting this advertisement without authority having been first obtained.

FRED. WHITE,
Comptroller, N. W. M. Police.
Ottawa, March 25th, 1887.



Department of Inland Revenue.

An Act respecting Agricultural Fertilizers.

The public is hereby notified that the provisions of the Act respecting AGRICULTURAL FERTILIZERS came into force on the 1st of January, 1886 and that all Fertilizers sold thereafter require to be sold subject to the conditions and restrictions therein contained—the main features of which are as follows:

The expression "fertilizer" means and includes all fertilizers which are sold at more than TEN DOLLARS per ton, and which contains ammonia, or its equivalent of nitrogen, or phosphoric acid.

Every manufacturer or importer of fertilizers for sale, shall, in the course of the month of January in each year, and before offering the same fertilizer for sale, transmit to the Minister of Inland Revenue, carriage paid, a sealed glass jar, containing at least two pounds of the fertilizer manufactured or imported by him, with the certificate of analysis of the same, together with an affidavit setting forth that each jar contains a fair average sample of the fertilizer manufactured or imported by him; and such sample shall be preserved by the Minister of Inland Revenue for the purpose of comparison with any sample of fertilizer which is obtained in the course of the twelve months then next ensuing from such manufacturer or importer, and which is transmitted to the chief analyst for analysis.

If the fertilizer is put up in packages, every such package intended for sale or distribution within Canada shall have the manufacturer's certificate of analysis placed upon or securely attached to each package by the manufacturer; if the fertilizer is in bags, it shall be distinctly stamped or printed upon each bag; if it is in barrels, it shall be either branded, stamped or printed upon the head of each barrel or distinctly printed upon good paper and securely pasted upon the head of each barrel, or upon a tag securely attached to the head of each barrel; if it is in bulk, the manufacturer's certificate shall be produced and a copy given to each purchaser.

No fertilizer shall be sold or offered or exposed for sale unless a certificate of

The Canada Co.

Will issue Licences to Prospect or to work Minerals on any of their Mining Lands and Mineral Reservations,

Covering nearly a

Quarter of a Million Acres

In Eastern Ontario, and principally within the belts containing

Iron, Phosphate, Gold, Galena, Plumbago, Mica, Marbles, Building Stone, and other valuable Minerals.

For list of lands and terms apply to the Company's Mining Inspector,

H. T. STICKLAND,

PETERBORO, ONT.



SEALED TENDERS, marked "For Mounted Police Clothing Supplies," and addressed to the Honourable the President of the Privy Council, Ottawa, will be received up to noon on Monday, 2nd May, 1887.

Printed forms of tender, containing full information as to the articles and quantities required, may be had on application to the undersigned.

No tenders will be received unless made on such printed forms. Patterns of all articles may be seen at the office of the undersigned.

Each tender must be accompanied by an accepted Canadian bank cheque for an amount equal to 10 per cent. of the total value of the articles tendered for, which will be forfeited if the party declines to enter into a contract when called upon to do so, or if he fails to complete the work contracted for. If the tender be not accepted the cheque will be returned.

No payment will be made to newspapers inserting this advertisement without authority having been first obtained.

FRED. WHITE,
Comptroller, N. W. M. Police.
Ottawa, March 25th, 1887.



NOTICE RESPECTING PASSPORTS.

PERSONS requiring passports from the Canadian Government should make application to this Department for the same, such application to be accompanied by the sum of four dollars, in payment of the official fee upon passports as fixed by the Governor-in-Council.

G. POWELL,
Under Secretary of State.
OTTAWA, 19th Feb., 1886.



Wanted, fair average samples of about 1lb. each, with prices, F.O.B. Address:

J. S. MERRY, Assay Office,
SWANSEA, WALES.

Mica, Minerals, Precious Stones

RICHARD BAKER & Co., General Produce Brokers, 9 Mining Lane, London, Eng. Advances made on consignments.

Reports Gratis on New Products.

Bankers: Agra Bank, London.

THE HARBERT TELEPHONE.

(For Private Lines)



SOLD outright. No renting. Just the thing for use in mines or mining districts. Over 5000 in use. Pat. Nov. 30, 1880. Late improvements. Send for descriptive circular.

EDW. HARBERT & Co.,
159 LaSalle St., Chicago, Ill., U.S.A.

FOR SALE.

ASBESTOS MINES

—IN THE—

Township of Coleraine, P.Q.
One Mile and a Half from Black Lake Station, Quebec Central Railway.
Address,

JAMES REED,
Inverness, Megantic, P.Q.

A copy of the Act may be obtained upon application to the Department of Inland Revenue.

E. MIALL,
Commissioner.

The Canadian Mining Review

OTTAWA.

PUBLISHED MONTHLY.

ANNUAL SUBSCRIPTION \$1.00

ADVERTISING RATES . . . 15c. per line (12 lines to 1 inch).

OFFICE:

UNION CHAMBERS, 14 Metcalfe St.

The CANADIAN MINING REVIEW, is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts, as well as others interested in Canadian Mineral Lands, are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 17th of the month.

For correspondence, &c., to the Publisher, the CANADIAN MINING REVIEW, Ottawa.

Advertising Space.

The circulation of the CANADIAN MINING REVIEW, which has steadily been going up since its first publication, more than five years ago, has now more than doubled the estimate upon which we had reckoned, and its value as an advertising medium to business men who wish to reach the best classes of mine owners and operators, and the mining centres and camps of every province in the Dominion, is consequently very greatly enhanced. The REVIEW is in the widest sense a Canadian journal belonging to all provinces alike; it is the only journal published in Canada wholly devoted to the interests of her mining industries and mineral resources. We would simply draw the attention of those who have hitherto overlooked it, to this matter, promising our best attention and most reasonable terms on any application for advertising space.

The Nanaimo Disaster.

The announcement and details of the terrible colliery catastrophe at Nanaimo has naturally created throughout the length and breadth of our Dominion a feeling of deep sympathy for the large number of unfortunate families who have thus so suddenly been bereaved. Out of a total of over one hundred white men and nearly seventy-five Chinese, only six have been brought out alive and these are more or less injured. In Victoria and other portions of the Pacific province a fund for the relief of the sufferers has been organized, and we feel sure that our readers in the sister provinces will also come forward and augment it with liberal contributions. Great suffering exists and practical assistance is wanted in the worst way.

Until the result of the enquiry, which has been instituted by the Hon. Mr. Robson, Minister of Mines, has been made known, the cause of the fatal explosion can only be con-

jectured, firedamp, coal dust, insufficient ventilation, carelessness on the part of the unfortunate miners, ineffective machinery and the like, are causes that have been hinted at. In the meantime a searching investigation should be made with a view to adopting preventive measures for the future.

Protection to the Mining Industry.

This can be accomplished in more ways than that which is generally understood to be the most desirable means or by an increased duty on importation to enable our minerals to be mined and smelted in our own country for our own use. That is one only of the measures, and we have no intention of under estimating its value, hence it is mentioned first as being the most important and that most easily adjusted to the requirement of all concerned. At the present time our metallic ores are mined with the object of supplying foreign markets, and little, comparatively, is utilized for local use, which is the more desirable method to pursue in order to receive the full benefit incidental to smelting and manufacturing them into the metallic state. The minerals requiring revision under tariff regulations are coal, iron, copper, lead, zinc, sulphur, and clays.

The other demands for protection are from evils that exist under, and that are incidental to, a wrong system of selling minerals along with the surface soil or agricultural right to Farmers and Speculators, and without regard to Citizenship. In doing so our Local Governments have sold an area of some millions of acres of our best mining lands, and these have passed into the hands of foreigners and non-residents, and no condition or provision is made by the Government so selling them, that these minerals will be developed and worked. But such is not the case with Dominion land homesteads, for provisions as to citizenship, location on the ground by possession, and development, are made compulsory. Are not mining lands worthy of the same protection as Dominion farming lands? Protection is required from an evil in the form of fraudulent schemes started and promoted by parties who are not mining men, but having a local knowledge of a district they may become associated with mining men and thereby gain a mere smattering of the business. Often they are American importations, and at times a combination of local and imported talent, who present a prospectus of a mining company with glowing accounts of "millions of tons of ore in sight that require nothing in outlay to market" "it but the mere blasting of it out of a mountain side!" or words similar to that and with that meaning. On such an untrue picture funds are secured and work and time prove, for it is reported by one of the company, that instead of costing only the actual expenses of mining the ore, it has actually cost \$20,000 to open one of the mines! The large mountains of ore do not roll into the railway cars as plentifully nor as fast as was promised, no

dividends are paid from mining the mountains of ore, or if any are, they are not from profits. Another dying or last attempt is made of still greater things a little further off which requires possibly railway extension and only a few millions of dollars, and such are the means used to bring ruin on what might be a workable scheme if conducted on business principles and with a regard to the true condition of affairs presented.

They may even not scruple at advertising to own a property they have only a half interest in! By such dishonest means some \$2,000,000 to \$5,000,000 of capital is sought to be invested in a manner we call neither legitimate business, honestly represented or a correct way of doing it.

The periodical, and now in Canada, historical mining excitement, is another form of fraud from which no good can result when the conditions for such, or anything to excite about, are wanting. If a large deposit, say of pyrites of low grade, or even several large deposits, are found several hundred miles from market or civilization, and in a country devastated by fire, there is certainly nothing to warrant a mining fever in that, as the conditions for successful treatment of such an ore are not found in the neighbourhood; it has therefore to be shipped to a market where it will mix with other ores and be treated so as to utilize the by products. Such a find or prospect is not a poor man's mine. To develop it is therefore interesting only to a manufacturer who can treat such an ore, and there is no money in it for the poor prospector as it cannot be worked on a small scale as easily as on a large one, and its value even to the manufacturer is a question of properties, freights and value, hence the folly of a mining excitement over such a discovery. It cost only \$500,000 to prove the truth of this in the Province of Quebec with similar ore and better conditions. Hence the ore is only a shipping ore and subject to competition in freight with other ores of a similar kind, which can be obtained nearer a market. We cannot see any reason why such an ore should cause a mining excitement. It is quite different where gold is discovered in alluvial diggings. There is nothing in it to warrant an excitement save only in the fertile brain of a schemer who desires to "sell" somebody in selling claims. It is only a question of freights, quality and price, like any other trade commodity dependent on supply and demand. Thus we have referred to protection by tariff revision; protection to mining lands against foreign or alien owners; protection against the locking up of mining lands; protection against fraudulent prospectuses of "Wild Cat" schemes and schemers; protection against false pretences and fraud; protection to capital from the employment of those who are ignorant or not trained to mining as a business, and the list not being yet exhausted will be continued in our next issue.

A National and Rational Policy.

The Budget Speech of Sir Charles Tupper and the welcome revision of the Tariff, with regard to the interests of the mining section of the community, are matters that must create an expression of pleasure among the readers of the CANADIAN MINING REVIEW. It is a fitting introduction to our appearance this month in a new dress, and is an event long to be remembered in the history of the mining industry of Canada. The law or action of the Government, that is productive of a national feeling of patriotism in preferring the product of the labor of our own country to the imported product of the labor of aliens or foreigners is a national policy. The law that encourages individual energy and the development of the manual and brain power of the community in the direction of producing the necessities of life from the natural products of our own country is a wise enactment. The law that converts our foreign trading importers into "home" manufacturers is the motive power of an incoming tide of national prosperity. The law that makes a foreign sympathising merchant an employer of Canadian labour, helps to build the hive of a national industry bound together by the strong bands of rightly directed capital and labour. The law that stimulates and encourages individual industry or effort in a right direction or cause, and restrains from a ruinous or wrong course is the law desired for the development of our Canadian mining industries. It cannot be expected that the home demand for iron can be supplied from local furnaces and mills until such time as sufficient of these have been constructed, but when that is done and the home industry is established, the iron trade will be supplied with a superior class of ores to work with than those of Great Britain. No business employs so much labour as does iron, for (it cannot be pumped like oil or elevated like grain), it has to be handled whether in the form of ores or metal, and every time that is done it means an expenditure of ten cents a ton on the millions of tons handled over and over again during its manufacture and transportation. In this way the wages earning community are benefitted. That Sir Charles has underestimated the value and results to be derived from this new lease of life to an almost extinguished industry would not be so apparent had not the wisdom (?) of Sir Richard Cartwright drawn attention to the idea of exporting Canadian iron. Sir Richard is evidently not aware that Canadian charcoal pig iron has been exported to the United States, and is in demand on account of its superior quality if enough was manufactured during the present time to supply the demand. To all sections of the country the wisdom of the new tariff will become apparent. Probably no other country is more richly endowed by nature with such stores of iron, and in offering these inducements to capitalists to develop our iron resources the Dominion will find it to pay well.

What we want now is the much needed enactment of proper timber and mining regulations by the local legislatures.

The Use of Crude Phosphate.

The value of raw phosphate as a fertilizer is a subject that has created much discussion, but without, as yet, obtaining decisive results. The prevailing impression is that the crude phosphate is valuable for "a long pull" and gives out its good effects slowly during two or three years after its application to the soil, whereas the superphosphate, which is phosphate reduced to a soluble condition by admixture with sulphuric acid, produces its full effect during a single season. The preparation of the acid is expensive and agriculturists are suspicious of manufactured fertilizers, for doubtless they are sometimes fraudulently prepared. If the value of the crude phosphate can be established, it would provide a cheap fertilizer in a form that would secure confidence, and the use of it would become greatly extended to the advantage of our miners and the benefit of the farmers.

Prof. N. S. Shaler, of Harvard University, has taken a great interest in the subject and is confident that simple methods may be found by which phosphates may be made available as manures without treatment with sulphuric acid. He proposes that thorough experiments should be made and will arrange for their trial at the Bussey Institution, an Agricultural Department of Harvard University under the care of Prof. Storer. The Bussey Institution would provide the land and the useful laboratory, and a skilled chemist would supervise the tests. The United States Geological Survey will probably contribute something towards the expense, and private firms have expressed a willingness to do likewise. If it was a product of the United States that was under consideration the whole expense could be at once provided for in that country, but as it is a matter of primary concern to Canada, it seems fitting that our Government or our miners should aid in the project.

Dr. A. R. C. Selwyn, Director of our Geological and Natural History Survey, has had his attention occupied by the subject for a considerable time and proposes in conjunction with Prof. Saunders, the Director of the recently established Experimental Farm, to commence and carry out the necessary experiments. It is much to be desired that this should be done as there are few subjects of greater importance to the country than the securing of cheap and effective agricultural fertilizers, and if the utilization of our mineral deposits can be promoted at the same time the matter assumes increased consequence.

Mr. Bowker, of the Bowker Fertilizer Company of Boston, in a recent lecture, while expressing an unfavourable opinion of the value of crude phosphate for quickly growing crops, admits its possible ser-

vice with grass and fruit trees. Prof. Shaler says the superior richness of the blue grass of Kentucky is due to the phosphoric acid in the soil, and indicates the value of phosphates as a manure. Some recent experiments with flower seeds show a great superiority of growth where crude phosphate was applied, suggesting that it is immediately effective; but such experiments need to be multiplied and the methods and results carefully watched by scientific observers before reliance can be placed upon them.

Our Government cannot do a better service to the country than by promoting this investigation, and as many tests are needed to establish the facts and unusually good facilities are offered in the proposed experiments at Harvard University, it would be well to encourage that effort also. Should any of our miners or agriculturists desire to contribute towards the promotion of the investigation in the United States they should communicate at once with Capt. R. C. Adams, of the Anglo-Canadian Phosphate Company at Montreal.

The National or Geological and Natural History Survey Museum.

Looked at from a Business Standpoint.—Economic Minerals and Mining as a Part of the Wide Field Covered.

[By a member of the Geological Survey staff.]

Recently it has fallen to my lot to glance over the fields of work occupied by the Geological Survey in the past. What led to this was the need of grouping the reports of the Survey by provinces, and the many different branches of work performed by specialists according to their general subject, in connection with the names of the specialists whose work it was desired to trace—felt as a means of inquiring into certain exhibits in the museum.

With the permission of the Director of the Survey, I have here extracted a small portion of my notes, thus incidentally made, appropriate to the field of the CANADIAN MINING REVIEW. The topic is timely on account of its suggestiveness in connection with the general subject of a national museum.

SCOPE.

I find the contents of the Geological Survey or "National Museum" building in its present state, to be classifiable,—including all that is therein presented by the older to the younger generation,—the reports of the Survey in the book room and library, along with the exhibits in the museum, as follows:—

I. *Physiographic Work*, representing all the provinces; embracing geological and geographical surveys, and field work in various departments more or less special. Reports, specimens, photographs, &c.

II. *Economic Minerals*, mining and mining geology. Analysis of minerals &c.

III. *Biological Work*, embracing—
(a) ancient and extinct life as a means of under-

standing the past and present world and its inhabitants. (palæontology.)

(b) natural history, including animated nature as far as interesting or important to mankind.

(c) botany, including forestry, agricultural plants, &c.

(d) ethnology, including human inhabitants of the country in the past and present.

IV. *Cartographic* work, embracing everything in all departments capable of being represented in graphic form, such as maps, sections and diagrams.

V. Exhibits in all the above mentioned departments; embraced in the museum and library.

WEALTH ACCUMULATED.

Any one familiar in the slightest degree with the operations of the Geological Survey will recognise at once the wealth of matter that has accumulated in each of these departments.

Omitting the more general and better represented departments (except to remark regarding them that they are all crammed to overflowing in a building not fire-proof) I will append a brief abstract of Sub-division II, the titles regarding minerals and mining since the Survey was organized. It will illustrate the character of the work done in a department not very extensively represented in the industries of Canada, and serve as an index to that industry in each of the provinces so far as represented in the museum and library.

THE WEALTH UNDER THE SURFACE.

The economic minerals form the main feature of the first floor of the museum. The arrangement is according to the uses to which they are adapted. A second feature of the same floor is the Scientific Collection of minerals, in which all the minerals represented in the Dominion are arranged according to their chemical ingredients and natural relationship to each other. A third feature of the floor is that of the Metals and their Ores (arranged in the flat glass cases along the centre of the room), and remarkable for its completeness and general excellence. Though forming Class I of the Economic minerals it is on account of its importance placed separately. The subdivisions of the Economic minerals (the balance arranged along the walls on both sides) are:—

1. Metals and their ores.
2. Fossil fuel.
3. Minerals applicable to certain chemical manufactures and their products (see also under 4).
4. Mineral manures (see also under 3).
5. Mineral pigments and detergents.
6. Salt brines and mineral waters.
7. Materials applicable to common and decorative construction.

The only exhibition beside these mentioned on the first floor is that of the rocks. It is arranged in the centre according to formations; consequently is also important to mining. Mr. Broadbent is constantly adding to the

attractions of this floor, devoting all his time to it; so that every day visitors will find in one or another of its departments something new.

PUBLISHED INFORMATION.

It is proper to remark that the library is an important part of the museum, as containing all the published information extant, and the reports of the Geological Survey describing the contents of the museum. It is open to the public, like the museum itself, and has in attendance a librarian who is always ready to produce any required report. It is only necessary to explain that the years mentioned below are part of the titles of the reports, referring to date of field work, not of publication.

MINERALS GENERALLY RELATING TO ALL THE PROVINCES.

Sir Wm. Logan was a practical mining engineer by education and experience. He never made any geological report without doing full justice to the economic minerals of the country examined. Some of his work was catalogued anonymously.

T. S. Hunt.—Mr. Hunt's catalogued reports began with that on mineral springs, ores, &c., 1845-46 and 1848-49, and embraced Ontario and Quebec minerals promiscuously down to 1869. He reported on various minerals and mineral waters, 1847-48; on mineral springs, ores, &c., 1848-49; on soils, peat, asphaltum, mineral springs, &c., 1849-50; on various mineral waters, 1850-51; minerals, soils, mineral waters, &c., 1851-52 and 1852-53; sundry analyses, manufacture of salts from sea water, metallurgy of iron, 1853-56; on dolomites, limestones, fish manures, &c., 1856-57; on intrusive rocks, minerals from silurian rocks and on the history of magnesia limestones, 1858; on petroleum and salt, 1863-66; on peat and its applications, 1863-66; on mineralogy of gold veins and method of gold working, 1863-66; notes on iron ore, 1866-69; petroleum (separate report) in Gaspé, 1865; Canada: a geographical, agricultural and mineralogical sketch (separate report), 1865. In 1867 (separate report) he published a sketch of the Geology of Canada for the Paris exhibition of that year.

Anonymously catalogued.—As appendices and otherwise, including maps accompanying the reports elsewhere mentioned, some titles occur in the "List of Publications" not connected with any authors names:

Statistics of copper mining and copper smelting in Great Britain, 1846-47; catalogues of some of the economic minerals and deposits of Canada, 1849-50; descriptive catalogue of a collection of economic minerals of Canada and of its crystalline rocks (sent to London exhibition for 1862—separate report), 1862; ditto, including stratigraphic collection sent to Philadelphia, 1876; ditto Paris, 1878; on the Goderich salt region (reprinted from the transactions of American Institute of Mining Engineers vol. V), 1876-77.

J. R. bb.—Mining and mineral statistics, 1871-72.

B. J. Harrington.—Notes on samples of brick clay from Fort Garry, analysis of serpentine, &c., 1872-73; on the iron ores of Canada and their development, 1873-74; notes on a few Canadian minerals and rocks, 1874-75; notes on miscellaneous rocks and minerals, 1876-77.

G. C. Hoffman.—Chemical contributions to the Geology of Canada, 1874-75, 1875-76, 1876-77, 1877-78, 1878-79, 1879-80, 1880-82, 1882-84 and 1885; on Canadian graphite, 1876-77.

L. Smith.—Observations on the history and statistics of trade and manufacture of Canadian salt, 1874-75.

Prof. Dittmar.—Analysis of the waters of Hayes and Nelson rivers, 1879-80.

E. Coste.—Mining laws and mining policy, 1885; in hand (assisted by Mr. Brummel) statistical report of mining operations in all the provinces.

ECONOMIC MINERALS—NOVA SCOTIA.

Logan & Hartley.—On the Pictou coal field, 1866-69.

E. Hartley.—On coal and iron ores of Pictou County, 1866-9. Spring Hill coal field 1886-9. Map in Atlas of 1863.

T. S. Hunt.—On the gold region of Nova Scotia. (Separate publication) 1868.

A. R. C. Selwyn.—Observations on gold fields, 1870-1. Acadian vein deposits, Londonderry and Colchester, 1872-3.

Jas. Robb.—On coal mines of eastern or Sydney coal field of Cape Breton, 1872-3.

Scott Barlow.—On Spring Hill coal field, with map, 1873-4. Survey of coal in fields Cumberland County, 1875-6.

W. McQuat.—On coal in Cumberland County, 1873-4.

Map accompanying reports, map of Acadian iron mines, 1872-3; index map of Spring Hill coal field, 1873-4; map of Sydney coal field, one inch to one mile, 1873-4; ditto same scale, 1875-6.

NEW BRUNSWICK.

R. W. Ells.—Borings for coal at Newcastle bridge, 1872-3. Second report on same, 1874-5. Iron ore deposits of Carleton County, with map, 1874-5.

Map accompanying reports, map of Grand Lake coal field, with older rocks in Queen's and Sunbury, 1863. Map showing distribution of iron ores in Carleton County, 1874-5.

QUEBEC.

Sir W. Logan.—On the gold of the Chaudière region, 1850-51; economic minerals from Montreal to Cape Tourment, 1852-53; the Ramsay lead mine and Acton copper mine with miscellaneous economic minerals, 1858.

B. J. Harrington.—On minerals of apatite bearing veins in Ottawa County, 1877-78.

A. Michel.—On the gold region of Lower Canada, 1863-66.

T. S. Hunt.—Mineralogy of gold veins, 1863-66; petroleum in Gaspé (separate publication), 1865.

R. Bell.—Map of Gaspé in connection with the above (separate publication), 1865.

A. R. C. Selwyn.—Observations on gold fields, 1870-71.

J. F. Torrance.—On apatite in Ottawa County, 1882-84.

G. Broome.—On phosphate of lime and mica found in North and South Burgess, 1870-71.

H. G. Vennor.—Plan of Dalhousie iron mine, 1872-73; explorations in Frontenac, Leeds and Lanark counties, 1873-74; plumbago and apatite in Templeton, Portland and Ottawa counties, 1873-74; explorations in Renfrew, Pontiac and Ottawa counties, with additional notes on iron, apatite, and plumbago in Ottawa County, 1876-77.

C. W. Willimot.—On mines in Quebec, 1880-82.

Anonymously Catalogued.—Localities of copper ores in the Silurian of Lower Canada, 1858; on copper localities, 1863-66; notes on the gold region of Eastern Canada (reprint of various reports from 1843 to 1863—separate publications), 1864; map of North Burgess showing the positions of apatite openings, 1876-77; map showing phosphate of lime in Ottawa County, 1876-77.

ONTARIO.

Sir W. Logan.—On the geology and economic minerals of Lake Superior, 1846-7; on various economic minerals, and on the Industrial Exhibition of 1851, 1851-2; on the Ramsay lead mine and the Acton copper mine, and miscellaneous economic minerals, 1858.

T. S. Hunt.—On the Goderich salt region, 1866-9; on the gold region of the County of Hastings (jointly with A. Michel—separate publication) 1867; locations of copper ores in the Huronian rocks of Mississagui river, 1858; on the Goderich salt region (reprinted from the Transactions of the Canadian Institute of Mining Engineers, Vol. V) 1876-7.

H. G. Vennor.—On the geology of portions of Hastings, Peterborough and Frontenac counties, Ontario, with geological map, 1866-9. (Vicinity of Belleville).

Marmora gold mines, 1871-2; notes on economic minerals of Ontario, 1874-5.

T. McFarlane.—On the geology and economic minerals of portions of the County of Hastings, 1863-6; Laurentian, Huronian and upper copper bearing works of Lake Superior; with an appendix on the rocks and enopiferous beds of Portage Lake, Michigan, 1863-6.

HUDSON BAY AND LABRADOR.

R. Bell, Professor Dittmar.—Analysis of waters from Hayes and Nelson rivers, 1878-79.

MANITOBA.

B. J. Harrington.—Brick clay from Fort Garry, 1872-73.

G. C. Hoffman.—On lignites, 1873-74.

NORTH-WEST TERRITORY.

R. W. Ellis.—Borings for coal, 1875-76.

A. R. C. Selwyn.—Borings for coal on Souris R, 1879-80.

G. M. Dawson.—On coal seams of Bow and

Belly river district, 1880-82; general remarks on coals and lignites, 1880-82; geology of Bow and Belly rivers with special reference to coal (separate publication), 1882; map of coals and lignites Bow and Belly river, 1880-82.

G. C. Hoffman.—Analysis of coals and lignites, 1882-84.

BRITISH COLUMBIA.

J. Richardson.—On the coal fields of the east coast of Vancouver Island with map, 1871-72; the same including Queen Charlotte Islands with map, 1872-73; report on the coal fields of Nanaimo, Comox, Cowichan, Burrard Inlet, and Lovke with general map, 1876-77.

T. S. Hunt.—Analysis of Richardson's coals from Vancouver Island, 1871-72.

B. J. Harrington.—On (Richardson's) coals from the west coast, 1872-73; gold, silver, &c., 1874-75 and 1876-77.

G. M. Dawson.—General notes on mines and minerals of economic value in British Columbia, 1876-77; same with additions (separate report), 1883.

C. G. Hoffman.—Gold and silver assays, 1875 to 1885.

A. Bowman.—On Cariboo gold region, with general map; also sundry districts with detail maps (in hand).

MATTER IN GEOLOGICAL REPORTS.

Not catalogued as individual reports but occupying a portion of almost every geological report issued by the survey since its organization, is the consideration of all economic minerals encountered in the area examined. An index to those would be furnished by a similar classification of the physiographical material in subdivision 1; though it is not difficult to check off any desired portion or locality from the general list of publications of the Survey, if one had time to read over the 300 to 400 titles.

POPULAR AND PRACTICAL.

The museum has a wonderful faculty of drawing visitors. Mr. Burke, the doorkeeper, who keeps a visitors record, informs me that the yearly average is not less than 14,000; monthly, 1,000; and daily in fair weather not less than 40.

They seem to find something that interests them. What is it? The museum is not so instructive in some respects as are the magnificent Agassiz and Redpath museums. When one knows how imperfectly the majority comprehend what the Geological Survey Museum really is, or grasp the idea of how it may be utilized in a practical way for useful or business purposes, the curious fact would seem to require explanation.

It is observed that the objects on exhibition are all native, and that the animal, vegetable, and mineral worlds in their several departments are all represented. An inkling at once asserts itself that here is accumulated a wonderful store of facts lying at the foundation of every industry in the land. No one man's travels could have won them. No single fortune could

have done it, for the Geological Survey has cost, in the 25 years preceding confederation, \$375,000, and in the 20 years since confederation, \$1,000,000. Has it not been a good investment? What has been the "idea" of so large an investment? For no one calls it an extravagance.

CONCEPTION OF THE MUSEUM.

An intelligent handling of ones resources is undoubtedly the first consideration in every business.

The Government performs many functions which it is created or called on to perform. It leaves all others to be taken hold of by individuals. It gives attention by preference to those things which enable the people to help themselves. Foremost among these is education—placing in reach of every one the necessary information to handle his resources and powers effectively.

The National Museum is *all the provinces in miniature*. Its object is to place the necessary knowledge and facts regarding the Dominion and its resources, with their surrounding and controlling natural conditions, conveniently within the reach of matured men, and legislators who are commissioned to attend to their interests. Without such knowledge collected and presented conveniently to their hand, they would be compelled to skirmish individually and unaided in search thereof, just as the child would have to do without the advantages of an education.

ITS GROWTH AND "MANIFEST DESTINY."

Here is an institution occupying a three story stone block at Ottawa (since many years forming a department under the direction of the Minister of Interior) which has had a continuous active existence since A.D. 1843. Is it possible that what I have written in regard to it, and the matter it covers, should be read in these columns by many intelligent people not strangers to the museum with something like the freshness of news? The publications here referred to in the briefest manner possible, are more fully described in the price list of publications of the Geological Survey (to be had gratis on application), and are sold approximately at cost, a nominal figure when the publication is separate. This is now the case with all reports and maps issued, though they are annually bound together into volumes, for libraries and reference.

Has the generation of Wm. E. Logan, of John A. McDonald and of J. W. Dawson, whose energies have been those of the Dominion in its youth, done well in presenting this foundation to the active men who are to pilot the destinies of the Dominion henceforward?

The mining exhibit only faintly indicates the far greater wealth of the museum in physiographic and biological material tributary to agriculture, and sundry arts and industries too numerous to mention. Now as it is the busi-

ness of every one to look out for himself, and presumably of the statesman also in his public not less than in his individual capacity, is it worth his while, on behalf of his constituents, to consider well for a moment any thought which, looking forward to the proper destinies of the Canada of the next generation, can build up within our means the noble conception of a national museum?

One of the functions that has been acceptably performed by the Geological Survey for years has been the supplying and aiding in building up of local and provincial museums. Subterranean regions in charge of Mr. Willmot, devoted to this requirement, are seldom seen or heard of by the visitor. Several of the provinces, having special local interests, have inaugurated provincial geological surveys, supplementary to those of the Dominion, and commenced local museums of their own; the good policy of which is apparent.

Canada has its *central* mineral belt, the copper, silver, gold and iron belts of the Lake Superior region extending northward, and Drs. Selwyn and Bell think repeating itself along the coast of Hudson's Bay. It has the *cordilleran* belt with all the mineral wealth that term implies in North and South America. It has also its *appalachian* gold belt, which is interesting on account of the reported richness of some of its ledges; and *sundry coal and iron regions*, which justify us in saying her capabilities of sustaining even large populations in unthought of "deserts," may be far better than we have imagined. If so her rigorous climate, during a portion of the year, may turn out to be an advantage rather than a drawback; and the aspect of probable national developments is materially improved.

A. B.



Latest English Quotations.

The latest quotation for Canadian phosphate is eleven pence three farthings to one shilling per unit, with a rise. At the latter figures it will net to shippers over \$19 per ton in Montreal, on a basis of a dollar and a half for ocean freight.

MINERAL PHOSPHATES.—English buyers have been enquiring for Canadian, but no large sales have been made since our last. Owing to low steam freights the price of South Carolina Phosphate has fallen still further, and it is reported that 7½d. has been accepted for some large cargoes. Ground Somme Phosphate has been in active request, and Raisers are as yet not prepared for the demand. The lower qualities, 65 to 70 per cent., and 60 to 65 per cent., are also in request, but principally to Continental consumers. Belgian.—The higher qualities of this material are suffering from the competition of Somme, and are offering relatively cheaply. 40 to 45 per cent. can still be bought

for forward delivery at tempting prices, and a fair business has been done. Cambridge and Bedford Coprolites are quoted respectively at 42s. f.o.r., or Ground at 50s. in buyer's bags, or 52s. in lent bags, f.o.r., and the latter at 26s., f.o.r., or 31s. 6d., f.o.b., Thames.

OTTY LAKE MINES.—This property lies mainly in the 7th and 8th concessions of North Burgess, Ont., and extends for upwards of two miles along the north shore of Otty Lake. It is one of the few properties in Ontario where any considerable amount of phosphate has been profitably mined by hand labor, and upon its acquisition last fall by the Anglo-Canadian Phosphate Company, (Limited) it was determined to try the experiment of working it with machinery. During the winter, in spite of the inclement weather and heavy snow falls, quite a mining village has been created and plant has been erected, consisting of an eighty horse-power Return Tubular boiler, a seven drill Ingersoll air compressor, rock drills, double cylinder hoists, Knowles and Worthington pumps, and all needed accessories. Work was fully started on one seam in the latter part of March, and in nine days 117 tons of high class phosphate were mined from one pit, the total number of men employed on the property being 33, only two-thirds of these being engaged in mining. The April thaw caused a discontinuance of the work to some extent, but two pits are now in operation with the machine drills, and a third is being fitted with one of the Montreal Steam Crane Company's steam cranes and a Knowles pump. This seam contains a body of pure phosphate six feet wide and is increasing in width as it deepens. The seams in this district are not often as wide as some of the deposits found in the Lievres river district, but they are more continuous. One of the seams now being worked has been opened on the surface at intervals for half a mile, and another has been proved to extend fully a mile. The seams vary in width from one foot to seven feet. One difficulty in the past in the prosecution of this industry has been that persons, working one seam by hand with insufficient capital, abandoned the work whenever the inevitable pinches of the seam occurred, although an expansion might be considered certain to occur at a little distance. It is believed that by working several seams in a large way an average result will be obtained that will yield good returns. The company owns its own teams and is hauling the phosphate over six miles of good roads to the Canadian Pacific Railway at Perth, whence it is brought to the ships side at Montreal. In winter the hauling is only three miles across the lake to the Rideau Canal where barges can load for Montreal.

The Otty Lake Mines are in charge of R. A. F. Penrose, jr., Ph.D., (Harvard) a highly educated chemist and mineralogist, who has devoted some years to the special study of phosphates. The result of his researches is now being published by the United States Government, and will be of much interest to Canadian miners. Dr. Penrose is making experiments upon the separation of the impurities from the apatite, and the company expect to erect grinding mills and supply the phosphate in a pulverized condition.

On account of the very high water there has been very little ore shipped from the Ottawa district as yet. The river has risen three feet higher than ever before known at Buckingham, and most of the phosphate piled upon the bank has been submerged.

The output from the various districts continues to be most satisfactory.

A meeting of the directors of the North Star Mining Company was held at Montreal on 17th inst. It has been decided to continue the sinking of their main shaft, which, at present, has attained a depth of some 550 feet, and is showing very good ore at the bottom. It is calculated that not less than 3,000 tons of 80% ore is now in sight. Mr. Charles Kyte, of New York, Secretary of the Company says that he is much pleased with the general outlook for the season.

The High Rock output for last month figures close in the vicinity of 750 tons. The management expect to forward from seven to eight thousand tons of high grade ore. Their steamer and scows have been newly painted and present a very pleasing appearance on the river.

At the Little Rapids mines work is being pushed vigorously forward, the usual excellent output of high grade ore at comparatively small cost to the management continues, and a brisk season is anticipated. The new tramway which has been constructed as far as the river is rapidly nearing completion. The locomotive and cars have arrived and await the laying down of the rails which have been delayed in shipment on account of the increase in the tariff. The Superintendent, however, reports that everything will be ship-shape and in complete running order by 15th of next month, at the latest.

At the Emerald mines a very fine body of ore is in sight and operations are being conducted smoothly and vigorously. Shipments have been delayed by high water, but about 150 tons have been forwarded to Montreal. The management expect to ship close on 6,000 tons before the season terminates.

Although we have had no report this month from the Union Company's mines, the output is believed to be fully up to that of last month.

Everywhere throughout the Ottawa district much activity prevails and everyday the richness of the vast deposits becomes the more apparent. Even the most skeptical now admit that the phosphate industry has a great future in store for it and that at the present rate of progression it must soon equal that of lumbering. Under existing management the large majority of the mines are being most profitably conducted, while with the new and improved mining machinery which has been generally adopted and the increased facilities that have been made and are daily being added, managers will be enabled this summer to deliver the mineral at point of shipment to the best possible advantage.

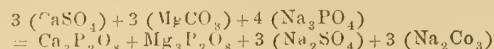
As is well known, very large deposits of clear green and otherwise colored apatite occur in Canada from which very large quantities are annually taken to be crushed and manufactured in superphosphates for agricultural purposes. Such deposits also occur in Norway, where they have been studied by Professors Brogger and Reusch, who declared them to be of eruptive origin. Dr. Harrington, after showing that they occur in rocks of a similar nature, though unlike in detail, shows that there is abundant reason for considering that they are not eruptive rocks, and thinks that they were gathered by and crystallized from solutions. It may be recalled in this connec-

tion that M. Daubree made apatite in a closed tube by causing a volatile phosphorous compound to act upon hot limestone, and he thinks that some such deposits may have been formed by sublimation. The opinion of Dr. Harrington is sustained by the previously formed opinion of Dr. Hunt, and it will be seen that every possible mode of origin has to-day weighty opinion in its favor. But argument of such questions is progress, and is a long step toward conclusion, and these studies have contributed much to our knowledge of these deposits. Dr. Harrington describes immense crystals of apatite a foot or more in diameter and several feet long.

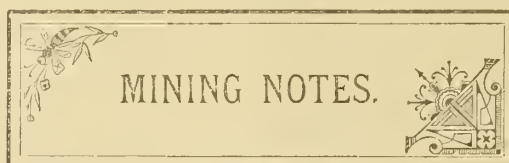
A process has been patented in Germany for the manufacture of precipitated phosphates from any kind of the ordinary crude rock. It is described as follows:—

"The rough material being first reduced to a very fine powder, is treated with just sufficient sulphuric acid to transform the carbonate and any free lime into sulphate. The mass is then subjected to the action of aqueous sulphurous acid, which dissolves only the tri-calcium phosphate and leaves the other constituents as a sediment. The clear liquid is decanted and subjected to a gentle heat; sulphurous acid is given off and reabsorbed in water—by means of a simple mechanical device—the phosphate itself being precipitated, washed, dried, and passed through a disintegrator. The preliminary treatment prevents the combination of the carbonate or free lime which would otherwise take place with the sulphurous acid, and averts the formation of a mixture of calcium sulphite in the final product."

"Tri-sodium phosphate" writes our esteemed contemporary, the *Engineering and Mining Journal*, "is being extensively brought to notice by the Keystone Chemical Company of Philadelphia, as a scale preventative. As is well known, the scale-forming matter in water, consists chiefly of lime sulphate, and carbonate, and magnesia carbonate, and hydrate, which are thrown out of solution by evaporation, and, falling as a dense crystalline precipitate, burn on to the iron in thick hard scales. These scales are very bad conductors of heat: a scale $\frac{1}{16}$ of an inch thick requires the use of 15 per cent. more fuel, $\frac{1}{4}$ of an inch, of 60 per cent more, while if it reaches a thickness of $\frac{1}{2}$ inch, the fuel must be increased by 150 per cent., and so on. It is hence apparent that to all manufacturers and all users of steam, any method of preventing this incrustation is a great desideratum. The use of tri-sodium phosphate for this purpose, has hitherto given the most undoubted proofs of its value. Nearly all the other scale removers in the market depend on their power of dissolving these lime and magnesia salts, and it is reasonable to conclude that if they will dissolve such a refractory substance as boiler scale, they will also attack boiler iron. This attack may be, and often is, gradual and slow; but it is none the less certain, though insidious. That tannic acid is destructive to boilers we have a practical proof in such peaty waters as are found in Florida, where the tannic acid formed in the water from the decayed vegetable matter actually corrodes the boilers to such an extent that in many cases copper tubes have been substituted for iron. Caustic soda is certainly effective in some cases, though the seams, rivets, and boiler shell, suffer badly from its solvent power, its affinity for sulphur causing it to eat out minute pin holes in the metal. Unlike any of these agents, the efficacy of tri-sodium phosphate is due to its faculty of decomposing the sulphates, and carbonates of lime, and magnesia, and forming in their stead, lime and magnesia phosphates, and soluble sulphate, and carbonate of soda. The following equation will give a general idea of the reaction induced:



The solid lime and magnesia phosphates are not dense, crystalline precipitates like the sulphates and carbonates, of which they take the place, but are light and flocculent, remaining equally distributed throughout the water as long as it is in ebullition and only settling down when the water is perfectly quiescent. Even when this precipitate does settle, it is in such soft, gelatinous condition that it can not burn on to the iron unless the water is first evaporated quite away; an impossible condition. Tri-sodium phosphate reacts equally well on metallic salts, such as copper and iron sulphates and carbonates, precipitating the copper and iron as phosphites, and leaving sulphate and carbonate of soda in solution. In cases where free acid is present in the water, as tannic acid in Florida, or sulphuric acid in the drainage of many mines, it will be neutralized by the alkaline tri-sodium phosphate, and the water thus be rendered harmless. Lastly, as tri-sodium phosphate does not itself act deleteriously upon iron, no ill effects beyond the waste of the substance will follow its excessive use.



Nova Scotia.

The latest brick brought in from the Moos-River Gold Mines weighs 76.8½ ozs., and is the result of crushing 58 tons of quartz.

During last year Mr. Tonquoy worked several leads on his property, among which might be mentioned the North, Little North, and Copper Lead. The South Lead was opened for about 60 feet. On the Copper Lead a new shaft was sunk, and about 70 feet opened. At present about 12 men find employment at the mine.

The following comparative statement showing the mineral production of the Province for the year 1886 is given in the annual report of the Inspector of Mines:—

	1885.	1886.
Gold.....Ounces....	22,203	23,362
Iron Ore.....Tons.....	48,129	44,388
Manganese Ore....."	353½	427
Barytes....."	300	230
*Antimony....."	758	645
Coal raised....."	1,352,205	1,502,611
*Gypsum....."	87,644	123,753
Building Stone....."	3,827	8,000
Coke made....."	30,185	31,604
Limestone....."	16,429	20,265
Grindstones, &c....."	2,208	1,600
*Moulding Sand....."	.....	200
*Amount exported.		

Mr. J. E. Hardman, of Oldham, has recently sunk a shaft on his property to the depth of 230 feet, and is now working on a lead which, in some places, is 5 feet in width. So far the quartz is said to have yielded gold at the rate of 10 penny-weights to the ton, and constant employment is given to 28 men.

Quebec.

Prospectors in the Rocher Fendu District have brought in some capital specimens of gold quartz, galena, and white marble. The height of the water, however, prevented these parties from prosecuting their researches sufficiently to ascertain whether these minerals can be obtained in paying quantities or not.

It is reported that a half-breed made a discovery of gold deposit in the vicinity of Golden Lake, Black River, last winter, and has shown many varied and rich specimens of gold rock, but he will not show the location of his find without being paid a large sum of money. The specimens have been submitted to an analysis, and have been found to contain gold in large quantities.

The discovery of a valuable deposit of lead is announced in the Township of Waltham, Pontiac County.

The Asbestos Mines are in active operation and the present prospects indicate an increased output for the year. The late dry weather has been suitable for this class of work and operations have been pushed ahead vigorously.

About 50 hands are presently employed at the Anglo-Canadian Company's Mine, and the management are taking out between three and four tons of asbestos per day. They are at present sinking on what is called the Emelie pit from the bottom of which ore of a very superior quality is being taken out.

The Scottish Canadian Company are still constructing buildings and adding machinery, but we understand that at present they are not taking out much asbestos.

The Thetford Mines are all in operation and running about as usual.

At Danville the Jeffrey Mine is being operated upon a small scale, but with what results has not been ascertained.

Ontario.

The Queen Gold and Silver Mining and Milling Company has been formed at St. Paul with a capital stock of \$1,500,000. One hundred thousand shares of the capital stock, amounting to \$500,000, is to be sold, and the proceeds used in developing the property of the corporation at Whitefish Lake, Thunder Bay District. Incorporators:—Henry S. Sibley, J. A. Boak, C. G. Kimball, J. H. Hullsiek, J. Q. Hass, A. C. Ramsden, St. Paul; A. H. Truax, Hastings. Officers:—Henry S. Sibley, President; C. G. Kimball, Vice-President; J. A. Boak, Secretary; J. Q. Hass, Treasurer.

A meeting of the directors of the Kingston and Pembroke Mining Company was held at Kingston, on Monday, 23rd inst. The company estimate that 100,000 tons of ore will be shipped this year from the various mines along the line of the Kingston & Pembroke Railway.

The *Nipissing Times* announces that a valuable deposit of gold has been made in the neighbourhood of Lake Tomogaming, about 16 miles south of the Ottawa River. An assay of some of the specimens taken from the holes uncovered is said to average about \$70 in gold to the ton. The deposit is owned by Mr. P. A. Ferguson, of Mattawa, and Mr. John Caverhill, of Montreal, who propose developing it next month.

PORT ARTHUR DISTRICT.

Reduction works are to be put in at the Crown Point Mine.

Arrangements have been made for the further development of the Z-nith zinc mine some 10 miles north of Nipigon Bay.

It is expected that during the summer efforts will be made to open up some of the iron and galena deposits in the neighbourhood.

Messrs McKellar Bros. have announced their intention of developing the vein at 5 B. Silver Prospect, near Trout Bay.

The *Miner* states that McKellar's Island will again be worked this spring for the spar which the American market requires to "improve" paints. Men have already gone out to Pie Island to fix up the houses of the men, as it is considered cheaper to fix the houses up there and take the men back and forth to McKellar's Island than either remove the houses or build new.

A meeting of the Keevatin Mining Company was held recently in the office of the Secretary, Mr. L. McMeans. Mr. J. W. Harris occupied the chair. The object of the meeting was to consider an offer submitted regarding the purchase of the mine. Several well known mining men are preparing to develop the mine, and more activity than has characterized mining operations lately is anticipated in the Lake of the Woods region.

Mr. O. Dounais, the discoverer of the Silver Mountain and Rabbit Mountain mines near Port Arthur, is reported to have purchased a mining claim in this district for \$10,000.

British Columbia.

Mr. G. Henderson, Superintendent of the Foster M. & M. Co.'s mines, has purchased one half of W. D. Pattern's claim at Nicola. A ten stamp mill has been ordered and arrangements are being made to actively push the working of the new concern.

A gentleman writing to Mr. H. B. Cameron, of Messrs. A. B. Gray & Co., from Granite Creek, says that an old Frenchman, named Pardee, has struck quartz about a mile from Granite city, on the east side of the Tullameen River. Pardee is an old prospector and has been working since last summer, feeling that rich quartz existed in the hills near the river. He was put down as a "crank" and no one would take notice of his statements. After he had satisfied his curiosity and made up his mind that his supposition was correct he induced two men to go with him, with the above result. The people in and about the creek are much excited and the country is staked off in claims nearly to Allison's. The Frenchman says that he is likely to make his fortune now, and as he has got the people worked up to his way of thinking he feels jubilant.

A sample of quartz recently taken from the Hixon Creek mines has assayed \$585 to the ton.

The Ashcroft correspondent to the *Calgary Tribune* says: "The developments of the Hixon Creek Mine reveal an immense body of ore, the west wall of which was reached 23 feet from the shaft. Forty-seven feet of a cross-cut failed so far to locate the east wall and the ore looks good the entire width. Stock in this property has advanced three hundred per cent. and is still eagerly sought after. Some difficulty is being experienced in getting men, as most men coming to this country go straight to the coast instead of looking about in the interior.

The Island Mountain, the B. C. M. & M. and the Hixon Creek, all quartz companies, have made application to participate in the assistance provided by the guarantee clauses of the Act of last session.

The stamps at the Foster Milling and Mining Company's mines have commenced crushing.

The latest strike at the Foster Company's Mine is reported to be an exceedingly rich deposit of black sulphurets assaying \$136 in gold and \$29 in silver to the ton.

The machinery for the Skirk Mining and Smelting Company, under the management of Mr. G. B. Wright, is being placed in position and will soon be in active operation. The engine is one of Ames celebrated 30 horsepower, manufactured at Oswego, N. Y.

A local exchange announces that "two mining superintendents from California and Nevada, who have just visited the Nicola mines, report very favourably on the prospects of the leads examined. The gentlemen are Messrs. Henderson and Probert, and the former has bought an interest in the Patterson mine; the latter will have an interest in an English syndicate that is expected to purchase the Nicola Mining Company's claim. A ton of low grade ore will be forwarded immediately from the mines to San Francisco to be further tested, and to supply the means of deciding what kind of machinery is most suitable for reducing the ores and working the mines. The machinery will be on the ground at an early date, and it is expected that it will be at work during the latter part of the summer. Two years work has been already done on these claims, and there are 600 tons of good ore now on the surface, but no ore has yet been realized on or reduced. It is probable that when the machinery at these mines is once in full swing that a considerable population will be attracted to the locality of Nicola; and as gold, silver, copper and other metals abound in the neighbourhood the prospects are bright in variety as well as richness. The Nicola mines, thirty miles by waggon-road from Kamloops, are situated near the Nicola River, which gives abundant water for continuous working and washing."

United States.

The quarterly report of the Plymouth Consolidated Gold Mining Company, ending 1st April, 1887, shews Gold Bullion produced as follows:—

January, 1887.....	\$62,350.49
February, 1887.....	60,683.75
March, 1887.....	59,296.45

Total product for three months, 1887.....	\$182,330.70
Operating expenses for same period.....	66,962.59

Profit.....	\$115,368.11
Cash on hand, January 1st, 1887....	81,079.89

Amount applicable to Dividends....	\$196,448.00
Paid dividends for quarter, No. 44 to 46, \$25,000 each.....	75,000.00

Surplus, April 1st, 1887....\$121,448.00

The Canadian Anthracite Coal Co.

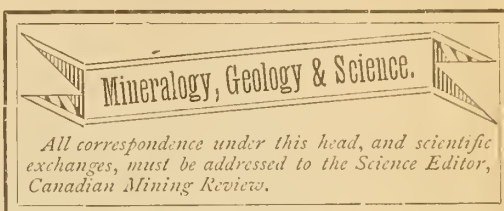
LIMITED.

Miners & Shippers of Coal.

McLEOD STEWART, Pres., OTTAWA, CANADA.	J. G. THORP, Vice-Prest. EAU CLAIRE, WIS.
A. PUGH, General Manager, ST. PAUL, MINN.	W. B. SCARTH, Secretary, WINNIPEG, MAN.
O. H. INGRAM, Treasurer, EAU CLAIRE, WIS.	

Mines at Anthracite,

N. W. T., CANADA. v-1-1y



The Royal Society of Canada.

Through the courtesy of Dr. Robert Bell we are enabled to furnish the following list of papers on geology, mineralogy, and other subjects of interest to the readers of the *Review*, to be submitted at the meetings of the Royal Society of Canada, presently in session at Ottawa. Judging from abstracts of the various subjects made by Dr. Bell, all these are full of scientific interest, and when published in the *Transactions* of the Society many of them will be of much practical value to the general public. The Session will close on Saturday, 23rd instant. Mayor Stewart will entertain the members at a garden party to be given at his residence on Friday afternoon, the 27th inst. The number of papers promised and already submitted is greatly in excess of that of former years.

A Comparison of the Flora of Hudson's Straits and the Arctic Regions of America. By Prof. George Lawson, Ph.D., L.L.D.

Additional Notes on the Geology of Aroostook County, Maine. By Prof. L. M. Bailey, M.A., Ph.D.

(A Geological Subject.) By Rev. J. C. K. Laflamme, D.D., M.A.

The Erosive Power of Glaciers, as seen in Norway. By Prof. J. W. Spencer, M.A., Ph.D., F.G.S., Professor of Geology in the State University of Missouri (formerly of the Geological Survey of Canada.)

The Correlation of the Animikie and Huronian Series of Rocks. By Peter Mackellar, Esq., (formerly of the Geological Survey of Canada.)

The Classification of the Trilobites. By Prof. E. J. Chapman, Ph.D., L.L.D.

The Diurnal Motion of the Earth in its Relation to Geological Phenomena. By W. A. Asher, D.T.S. (meteorological observer, Quebec, and delegate from the Literary and Historical Society of Quebec.)

The Economic Minerals of Nova Scotia. By Edwin Gilpin, M.A., F.G.S.

The Gold Bearing Rocks of British Columbia. By Amos Bowman, Esq., (of the Geological Survey of Canada.)

The Utica Formation in Canada. By Henry M. Ami, M.A., F.G.S.

The Classification of Rocks. By Thomas Macfarlane, M.E.

The Geography and Geology of Baffin Land. By Dr. Franz Boas (arctic explorer and editor of *Science*).

Theory of the Movement of Land Ice. By J. W. Spencer, M.A. Ph.D., Professor of Geology in the State University of Missouri.

Petography of the Drift of Central Ontario. By Dr. Coleman, Victoria University.

Papers of unusual interest on kindred subjects will be submitted by Dr. Bell and others. In our next issue we hope to be able to publish abstracts from such papers as are of more immediate concern to the mining public.

A new publication on Algoma West will be submitted to the public early next month. The mines, scenery and industrial resources of the district are said to be special features of the work which is edited by Mr. W. Roland, C.E.

The Great Ice Age and Subsequent Formations at Ottawa, Ontario.

By H. M. Ami.

Of the Ottawa Field Naturalists' Club.

This portion of the American Continent, which, during the earlier palæozoic period had alternatively been submerged and elevated, remained in this latter state a long period of time, during which denuding agencies, such as atmospheric erosion, rain and other solvents carried away a great deal of material. This is a lapse of time, which, in other parts of Canada and elsewhere, is marked by a regular ascending series of newer formations deposited for the most part beneath the level of the then existing oceans, a period embracing within itself the whole of the Silurian and Devonian systems together with the Carboniferous age of the coal measures: the Palæozoic age thus ended, Mesozoic times came in and the Triassic, Jurassic and Cretaceous systems followed, overlying which all the Jaramie and Tertiaries were laid, all of which are entirely absent in our district marking a great unconformity between the Glacial deposits and the Hudson River rocks about Ottawa.

The *Glacial Epoch* or the *Great Ice Age*, then, is the first of the series of Post Tertiary times with which we have to deal, as it rests immediately upon, though with discordance of stratification (if that term may be employed here), and overlies the Cambro-Silurian and older formations in this district. Just previous to this period of glaciation, and whilst it lasted, there must have taken place a great elevation in this part of the North American continent, so that an extreme Alpine or Arctic climate was the natural result. Nor was this part of America the only one which enjoyed this particular state of affairs, but throughout the greater portion of North America as far west as the Great Missouri Coteau, in Europe and other continents, evidence of extreme cold, the result of great elevation, has, through the labours of leading geologists, been ascertained beyond doubt. Prof. Favre, of Geneva, whose admirable researches in Alpine geology have made him so famous the world over, in the "*Résumé*" of his "*Geological Researches in Savoie and the neighbourhood of Mt. Blanc*"—points out clearly what was the origin of the glacial epoch in that part of Europe. "The amount of moisture or humidity," he says, "with which the atmosphere of Europe was filled on account of the elevation of land subsequent to the deposition of the tertiary deposits—the cooling effect of the neighbouring mountains, then more elevated than now-a-days—together with many other causes, led to a reduction in the temperature of the atmosphere resulting in an abundant precipitation of snow on the leading peaks of the region." So in Canada, and in the Ottawa district: a great reduction in the temperature followed the great elevation, and immense quantities of snow, ice and water followed and glaciers were formed all over the district—a vast *mer-de-glace* covered this portion of Canada whose height above the ocean level of that period was very great. These glaciers, like modern ones, were characterized by many interesting particulars which a study of the latter can afford. The number, direction, movements, thickness, erosive or denuding power and the constituent parts of a glacier or a system of glaciers are questions full of interest. It has been ascertained that over four hundred glaciers can be seen in the central portion of the Alps, from Mount Blanc to the Tyrol, some of which are only three miles in length, whilst others exceed twenty miles from head to foot or from the point of origin to

the snout. There is abundant evidence to show that the number of glaciers which must have existed here about Ottawa is very considerable indeed, whilst the number of them in the whole of Canada and the United States must have been very great. Many of them, and perhaps the greater number, were subordinate or smaller ones and may, at length, have been absorbed in and formed part of "a great glacier." The direction in which they moved depended of course on the nature of the district, its physical or orographical character. The general trend of the great *mer-de-glace* in Canada during this epoch has been ascertained to be approximately N. E. and S. W. The direction of some of the glaciers as obtained from the striations or grooves on the rocks about Ottawa show that in some cases they travelled almost due east and west, as may be seen along Park Avenue, on Nicholas street and in other parts of the city, at other times they appear at a considerable angle to this direction, bearing almost due north and south, as at Buckingham on the Lièvre River. Regarding their movements, the speed with which glaciers travel, we consult Agassiz and find that he obtained the following results in 1841 and 1842 on some of the Aar glaciers:—

	ANNUAL MOTION.
I. FINSTER AAR—	
{ Stake near centre of glacier... 269 feet.	
{ " side " ... 160 "	
II. LAUTER AAR—	
{ Stake nearest centre of glacier... 245 "	
{ " side " ... 124 "	

whilst at Chamonix the ice near the shore of the *mer-de-glace* was found to move as follows, from June 29th to June 8th of the following year:

From June 29 to Sept. 28...	132 feet.
" Sept. 28 " Dec. 28...	70 "
" Dec. 12 " Feb. 17...	76 "
" Feb. 17 " April 4...	66 "
" April 4 " June 8...	88 "

Total (in less than one year), 432 feet

This would average over five hundred feet or about one-tenth of a mile in twelve months. The rapidity in the motion of a glacier, of course, depends upon the nature of the obstacles to be surmounted, as well as to a great extent upon the time or month of the year, whilst different portions of the same glacier move at a different rate. A glacier which descends into a valley below or discharges itself into a sea or arm of an ocean does not necessarily lose any of its length, for whilst its snout is being melted and carried away to warmer portions, the head or initial point is ever receiving additional snow and ice to supply it constantly, and only a subsidence of the continent could produce a change in the climate of such an ice bound district.

We have no data existing here or traces left by means of which we can calculate the rate of motion of the glaciers about Ottawa during the great ice age, suffice it to say that as in the case of modern glaciers so it must have been in the case of the old Ottawa glaciers, their rate of travelling varied at different times in different circumstances. Then as to the thickness of the great ice-mass which had then invaded this district, that is a problem which to a great extent, has yet to be solved with us, nevertheless, let us examine the data at our disposal in reference to this interesting phenomenon. Taking the Ottawa Valley, in and around the city, as a very typical example of a valley of erosion with subordinate branches, we see that facing the river, there occurs a series of high "bluffs" or cliffs where the strata are clearly seen along

their sides to be throughout, nearly horizontal.* That these beds could not have been deposited in such a position is beyond question and goes without saying, so that the prolongation of them northward must at one time have existed. What was it then, which removed all these and to such a depth? This very question gives us a clue to one factor at least in the estimate of the powerful ice-mass which, coming from the West or W. N. W. struck down upon the shales and limestones of the formations here to be found. It also gives us data to estimate its thickness. The occurrence of *striated* rocks at the top of old Barrack Hill, where the Parliament Buildings now stand, show that as that cliff is one hundred and eighty-seven feet above the level of the river, and over two hundred feet above the level of the bed of the river, the mass must have been much over two hundred feet. Further, in order that a mass of ice or a glacier carrying boulders and detritus—*moraine profonde*—can groove and polish the rocks of a district to such an extent as was the case here, the superincumbent weight and attending pressures must have been enormous, and from what is known of present glaciers, whether in alpine or arctic regions, their thickness is very great. A fair estimate, we believe, of the thickness of the glacier or *mer-de-glace* extending over our city and its environs during the glacial epoch must have been very little short of one thousand feet, if indeed that number is not too small. The erosive or denuding force of glaciers has just been touched upon whilst a great deal might be said on the subject; for, when we take into consideration the millions of tons of material which has been transported away from even the small area about our city and examine the amount of cutting, abrading and ploughing which must have occurred, it is simply marvelous to know where it all went. You can hardly pick up a loose rock or boulder in the fields without seeing written upon it indubitable marks of scratching and grooving, which, along with millions of others were held firm in a mixture of cementing clay and sand (to a small extent) carried forward upon the floor of the glacier and one against the other, at times, to such an extent that all angularities and rough points are removed and the boulders left smooth and polished. The *striations*, *grooves* and *polished* surfaces of rocks which up to this date attest clearly to the fact of the existence of those glaciers, besides the boulders themselves, may be seen not only in the places already mentioned, but in numerous other localities, and they only await the student of Post Pliocene geology to afford the information they can readily give at the corner of Sussex and Rideau streets, where an interesting spot occurs.

The effect of these glaciers upon the softer *shaly strata* of our neighbourhood is clearly shown in such a deposit of the Utica shales as is met at Cumming's Bridge, on the Rideau River or at the corner of Maria and O'Connor streets, some 12 feet below the surface of the roadway. At these two places, whilst the shales of the Utica formation also occur *in situ* and undisturbed at a greater depth than is visible in either section, the uppermost measures of the section exposed and examined cannot certainly be said to be strictly *in situ* as the beds are tilted at every conceivable angle, crushed and broken. In the overlying glacial deposits are to be found some of the boulders which assisting in tilting and disturbing these once horizontal measures.

*There are but few exceptions to this, due to dislocations, faults and folds in the strata of purely local origin, but not of general significance in this problem.

There occur a vast number of faults and dislocations in the measures of the Trenton and other formations about Ottawa, great breaks, which at times, run more or less parallel to each other and were the result of great pressure brought to bear upon the beds in question. Whether these faults and breaks are due to disturbances which took place about the close of the Silurian Age, or at the introduction of the Devonian, when *Rigaud* and *Montreal* mountains and other similar volcanic or intrusive masses were ejected amidst great perturbation; or whether some of these faults were not in part due to the enormous pressure which the great ice-mass exerted upon the strata in later glacial times are questions which, though readily suggested by the phenomena examined, do not find so ready a solution. Having now examined the number, direction, movements, thickness and the erosive power of the glaciers during this Great Ice Age, having very cursorily glanced at the results which were effected in giving the country the general appearance which it possesses at the present day, there remains to find out what are the materials which were deposited and under what conditions they were deposited.

The masses of *boulders*, also termed "*boulder clay*," "*moraine profonde*," &c., unlike both the underlying older and overlying newer deposits are *not stratified*, i. e. they have no divisional planes of stratification or true bedding. Pebbles of various sizes and of every kind of rock in the district, usually rounded and smooth, held together or cemented by an argillaceous paste or clay with a certain admixture of arenaceous material derived from the more finely crushed *detritus* and *debris* at the bottom of the glacier, form the lowest division of our Post-Tertiary deposits. These "*boulder clays*," as they are appropriately termed, have a very large percentage of boulders in them, the finer material being scanty and in a finely-divided or comminuted state.

Such a deposit is one which "*land ice*" alone produces and one which resembles wonderfully the "*moraines profondes*" of the ancient Rhône glacier as they may be seen near the Western extremity of Lake Geneva (a mile and a-half below) and in the adjoining districts. In further corroboration of these boulder clays being due to land ice is the fact that none of the organisms which would be expected to characterize marine clays are present therein. The total absence of organic remains (so far as ascertained) in these glacial clays, coupled with the fact of their occurrence in abundance in the Leda clays above point clearly to a wide difference in the mode and condition of deposition of both, the one being laid at a great elevation above the sea level, the other below the level of an ocean or arm of a sea.

In examining the surface geology of Ottawa, one is struck with the diversity in the distribution and extent of this "*boulder clay formation*." In some places, the only indexes present which point to its existence at one time, are the striae and grooves over the bare rocks, such as they are exposed principally about Hull and Ottawa in the vicinity of the Grand River, whilst there are also numerous fields and tracts of country which exhibit that formation very clearly. In such *glacial* and *post-glacial* valleys and districts, from which the "*Leda clay*" and *Saxicava sand* and overlying strata have been removed by denudation, there occurs a large quantity of these boulders. Amongst these are no doubt included, at the present day, the erratics of all which were dropped by ice-bergs at a period subsequent to the great ice age, nevertheless the character of the fields where this formation is met is well known, and especially to the agriculturist. The Rideau River Valley,

of post-Tertiary Age, and very recent geologically speaking, presents numerous points of interest from its mouth at the falls in New Edinburgh to the Hog's Back. Nearly the whole of the Post-Tertiary formations were carried away by the once wide stream which flowed in that vicinity, and even the glacial clays suffered not a little, as the materials cementing the pebbles are to a great extent entirely wanting. The Rideau Rifle Range extends, for the most part, over this formation, whilst the southern portion of the range, as well as its northern limit (at the 600 yard buttes) are on the outskirts of the newer overlying marine clays. We have already spoken of *moraines*. These vary very much in extent and distribution just as the "*boulder clay*" or "*till*," as it is also sometime called, varies from next to nothing to twenty feet or more in thickness in different places, and are extensively developed about Ashburnham Hill, Gilmour's Mills, near the Hog's Back, etc., occupying its lower and regular position at the bottom of the Post-Tertiary series in Upper Town, Centre Town and Stewarton, cropping out in the rear of the City Hall, on the east side of the canal, ever keeping its normal position. It is very generally distributed thence in beds varying in thickness in the area included in a curve drawn from the New Militia Stores on the canal along Sussex street up to St. Patrick street then produced on to the bridges over the Rideau river, pretty nearly in a line with the curve which Sussex street there describes, and across to New Edinburgh through the Rideau Hall grounds to a small extent where these deposits thin out markedly, and continuing the line through Beechwood, in Gloucester, on in a south-easterly direction, we have a horse-shoe curve, in which are included vast accumulations of material left us by this Ice Period. But to come back to the *moraines*:—There are, besides these hard, coherent masses of "*boulder clay*," large aggregations of more or less uniform-sized boulders held very loosely together which form a prominent feature of the country. At Gilmour's Mills there is a good example of one of these whilst there has already been pointed in the "*Geology of Canada*," 1863—already cited—that a number of zones or belts of boulders cross the Ottawa at different places near the city, one of which a few miles below Ottawa produces a shoal on account of which the navigability of the river at this point became dangerous and obliged the Government to erect a lighthouse. These are what are termed "*morainic belts*," and are prominent features to consider.

There are a number of other particulars respecting which the detailed notes obtained from the excavations that have been carried on in our streets, though bearing immediately on this subject, cannot be included for the present.

Following this period of *great elevation* and of extreme cold there came a period of *submergence*. Nor must it be surmised that the subsidence which took place in this part of the country was necessarily effected in a short time; on the contrary, it must indeed have taken ages for the country to have come down even to the level to which it is at present—a height of some 215 feet above sea level at Ottawa. As the elevated ice-bound country was gradually subsiding, there came an amelioration in its climatic condition, and more temperate seasons ensued. The glaciers which at one time discharged their materials in valleys and on land—feeders to a regular system of glacial rivers both in the lowlands and in the mountain districts—now discharged these along the coast, and coast-ice and icebergs were soon at work as the sea was encroaching upon the land and depositing over the old beds of the

glaciers a series of sedimentary strata, with which there came also the life and organisms common to such *habitat*, so that the next period or formation with which we have to deal is one of marine origin, deposited in the still depths of an ocean or sea and containing the remains of animals common to that period in the earth's history. Meanwhile innumerable quantities of ice-bergs, carrying with them large blocks of rock and detritus—themselves portions of glaciers—were scattering their burden over the bed of this ocean or sea, as the warmer regions were reached, as at the present day, along the coasts of Labrador, Newfoundland, and adjacent districts, the icebergs detached from their northern fortresses sweep down towards the centre of the earth—no doubt to a great extent due to that transporting force developed in the rotation of the earth.

There are certain geologists, I believe, who would account for the *grooves*, *striations* and *furrows* in the hard rock masses below being formed, through the agency of *coast-ice* and *icebergs*. Whilst admitting the possibility of certain local and limited areas as capable of being effected by the agencies above mentioned, there is little doubt that they are together wholly inadequate to explain the phenomena of striated surfaces (see Prestvich) over such vast areas, as it is known that these surfaces extend, in some cases, for hundreds of miles.

But, of the sedimentary strata which, during this period of submergence, were being laid down over the remains of the glacial epoch the lowermost series consists of bluish gray clays of more or less plasticity and varying greatly in thickness in different parts of this region. There are a number of sections both *natural* and *artificial* which this district has afforded. Amongst the latter may be mentioned the Rideau Canal, which from the "*Basin*" to the "*Deep Cut*" "gives a very good idea of the thickness of these clays there. Then the hundreds of sections which the recent excavations carried on by the City Engineer have exhibited where in almost every instance, the clays may be seen in their normal position though in some cases they are totally absent. Then comes the brick-yards owned by the Messrs. O'Dell, Clark, Nicholson, Graham and others. In the first mentioned of these—Mr. O'Dell's—have been found remains of a fossil sponge, the *Tethea Loganii* of Dawson, together with *shells* and *foraminifera* and a bone sent to Prof. Cope for identification, all of which were communicated and presented to the writer through Mr. A. P. Low, B. App. Sc., of the Geological Survey of Canada. But whilst *artificial sections* are often more convenient in ascertaining the relative thickness of the different kinds of strata, nevertheless, the *natural sections* which are met with everywhere, enable us to obtain the geographical distributions, extent and thickness, sometimes with greater facility, as these sections are very numerous indeed. Along the left bank of the Rideau River, e. g., from the Hog's Back to the Falls, down the Ottawa as far as Green's Creek, and farther across the river in Hull Township as far as Ironsides, and above that towards New Chelsea. In Nepean and Gloucester Townships there are hosts of *natural sections*, where the "*Leda clay*" formation is well exposed—antiquaries the name implies, so-called on account of the prevalence of a small bivalve shell,—*Leda (Portlandia) arctica*, *Gray* which is, in its measures, quite commonly and it occurs everywhere exceedingly characteristic.

An interesting point about these clays and accompanying strata is the fact that they occur in many instances in the shape of "*terraces*" or

small plateaus following one another at different levels. Standing on Parliament Hill some of the more prominent 'terraces' may be clearly seen to the N. forming for a considerable distance an almost unbroken line of level stretching from east to west in the general trend of the Ottawa River. One of these occurs just above Ironsides, as many members of the Club have had occasion to notice, forming a general plateau of clay covered by a thin stratum of sand. These terraces point indubitably to a period of subsequent elevation which was characterized by oscillatory movements i. e. a period elevation which is not constant, during which periods of quiescence intervene. Such an elevation predicates the next period with which we are to deal; but before entering upon this latter, there are important results which must be noted with regard to the "Leda clay" formation. Imbedded within its measures are found a goodly number of interesting organic remains. Nearly all of them are of marine origin and consist in the remains of shells, insects, animals and even plants which will together, when all examined and determined, make not far from thirty distinct species.

With scarcely a single exception all of these species of shells and animals can be dredged up alive now-a-days either in the Gulf of St. Lawrence or along the Coasts of Labrador or Newfoundland, and even as far as Norway. Their mode of preservation is not an uninteresting fact to record, as it is peculiar even in different portions of the same formation. At Green's Creek, for example, on the Lièvre River, and in other localities likewise, both above and below our city, these places are noted for the peculiar nodules which are found included in the clays. By some such process as concretionary action can the agglomeration of finely divided particles of argillaceous rock be best accounted for organism, principally around some nucleolus whatever it be—a pebble perhaps as in some instances. Numerous remains of the *Nautal*, *Mallotus villosus* (Cuvier) occur in this manner whilst it more often happens that the nucleus is so small as to be invisible. These nodules have also yielded two other kinds of fish, the lump sucker and a sculpin found by Mr. Stewart recently, all these still living in the Gulf of St. Lawrence. Sir William Dawson has a beautiful collection of these nodules from Green's Creek, from which he has identified a large number of species of fossil plants, among which are twigs and bunches of the white cedar which is met with not unfrequently. Another mode of preservation of these fossils at Green's Creek is through the infiltration of a siliceous solution, so that shells are as the remains thoroughly silicified in this deposit as they are in the Black River formation at Paquette's Rapids, or in the Corniferous formation of Western Ontario, muriatic acid not affecting the shell in the least. Others are preserved with but little change from the character in which they were entombed whilst others appear as if they were live shells with the *epidermis* on and nicely preserved.

Of the other fossils which characterize this formation a great deal might be said, but passing over the important discoveries of seal remains made by Dr. Grant of Ottawa years ago, and noticing the feather or remains of birds which Lord Lorne obtained when on a collecting tour at Green's Creek, during the term of his administration in Canada, and merely mentioning the fact that a number of insects have been found there on different occasions by various persons, it will also suffice to mention that during the past season a large number of *Foraminifera* were collected. These are minute

microscopic, shell-like protozoa of very simple organization internally, but the shell itself or place of habitation of the animal is very elaborate, and in many cases beautifully ornamented. These organisms are flourishing in the abyssal depths of the ocean and thrive also along our shores whilst they abound in the Gulf of St. Lawrence, and to such extent that as the sounding lead of a steamer touches the bottom, it often brings up a number of these alive. Dr. G. M. Dawson, whose extensive researches in Post-Tertiary Geology have enabled him to give valuable information regarding the best mode of obtaining these very minute organisms from the clays and of working out the microscopic character of the deposits in question, has very kindly given the writer such hints as have proved of utmost value in this connection, so that by a series of percolations of a solution of clay and water, on sheets of blotting-paper or filter paper, a large number of specimens were obtained. The largest of these, and a common species in nearly all the collections from the Gulf and elsewhere, is *Polystomella crispa*, L. It also occurs here at Ottawa. Besides these forms there remains a great deal of material ready to be worked up and awaiting identification.

It has already been hinted that the "Leda clay" formation, laid down beneath the level of an ocean or sea which extended in this region as far west as the Bonnechère, River (*loc. cit.*), was followed by a period of elevation. Whilst these clays were thus being deposited along the bottom of the sea, i. e., at some distance from the shores, the sands and gravels which usually mark the littoral deposits of an ocean were being deposited in this vicinity in regular order. They are arenaceous deposits in which distinct lines of stratification occur where both the sands and gravels overlie the clays everywhere, but their thickness varies considerably in different places. This uprising of the continent which exposed to view the former depths of the ocean, once begun has continued on, and there is no index to point out whether this elevation has, up to the present day, ceased. The sands and clays which were laid along the shores and bottom of the old Ottawa Sea, up as far as the Bonnechère River, are now some 500 feet above the mean tide level at Three Rivers, so that there must have been, at least, an elevation of 500 feet in this part of the American Continent in later Post-Tertiary times. These sands, to which the term "*Saxicavea Sand*" has been applied by Sir W. Dawson and others, are very generally distributed over the gravels, clays and older boulder glacial clays in this district. Sandy Hill received its name no doubt on account of the prevalence of this rock about that part of the city, although there is perhaps 15 or 20 times more clay on Sandy Hill than sand. Near the junction of the sands with the clays below and in places when the the gravels are not coarse, there are found several species of fossils, some of which have already been recorded in the Club's transactions. *Macoma Calcareea*, Chemist, *M. fragilis*, Fabr., *Natica affinis*, Guelin and others occur in these deposits, but as a rule they are nearly always destitute of fossils. As there must certainly have been many at one time their remains must have been decomposed and become obliterated. A peculiar seam one inch in thickness occurs near the corner of Waller and Rideau streets, and divides the Saxicavea sand into two parts. This bed consists for the most part of leaves of poplar and other trees, bits of grasses and sedges held together, but it is continuous only over a limited area. The upper portion of these sands is that with

which we have last to deal, and is included in that period which we call here the Human period, for in it do we find for the first time traces of the existence of human beings. The loam or surface soil, cultivated or not, that soil in which implements of stone are found associated with fragments of pottery, bones of deer, bear, beaver and other animals, points clearly to the fact that man of two distinct types has left his mark in these newer overlying beds. Previous to this, however, no records exist which show, that here in Canada, man came in these times except subsequent to the Glacial Epoch in the newer and present Historical age.

Nor is the economic aspect of the question, in reference to the use to which the materials which compose the Post-Tertiary deposits of this district can be put one of trifling importance whether in furnishing useful materials to railroad, commercial, agricultural, or other interests. For ballasting, road metal and the like, the Saxicavea Sands, gravels and Boulder Clay formations have been extensively used by the Canada Atlantic and Canadian Pacific Railway authorities throughout this district along their roads at Ottawa and its environs, whilst the sands themselves afford splendid material in the manufacture of mortar for building purposes and to such an extent it is that a good sand quarry is more remunerative than a gold mine. But whilst these substances are of incalculable value to man, the marine clays of the "Leda Clay" formation supply the brick and tile manufacturers with the material wherewith to turn out these useful building and other requisites and likewise afford an inexhaustible supply of the argillaceous substance necessary in the manufacture of Hydraulic cements, of which the Hull cement of this locality well-known to be a good slow-setting cement.

There are many good brick-yards in the vicinity which derive their material from the clays in question, and whilst, it is not deemed necessary to signal out any particular one, nevertheless, that of Mr. T. M. Clarke, of New Edinburgh is worthy of note, as from it, that gentleman turned out a large quantity of white brick of superior quality, by carefully inserting a certain percentage of the white earth taken from the marls overlying the saxicavea sands at Hemlock Lake, in McKay's Grove, and submitting it to successful process. Brick manufacturing is a most remunerative occupation, especially in such a growing place as Ottawa, where the supply can scarcely equal the demand and the materials are ready and at hand. Mr. Wright, the manufacturer of the Hull Cement, informs me that the marine clays which he uses are very well adapted indeed for the purpose intended, being almost equal to the mud or clays dug out of the Thames in England, for the manufacture of the "Portland and Roman Cements," so famous everywhere.

The manufacture of pottery is likewise an industry or art which flourished at Ottawa, but as the place where the works were situated was in as bad a position as possible for the purpose, the enterprise has ceased to be carried on. It cannot be denied however that there is 'money in it' for whomsoever undertakes this industry and takes up a proper location.

The plastic nature of certain strata in the lower portion of the Leda clays afford good substance for modelling purposes and has already been used to a certain extent in this direction.

There is a large percentage of *alumina* in these clay deposits, and when we think of the vast advantages which the metal *aluminium* presents over such substance as iron, copper, lead and zinc, it may not be amiss to look for-

ward to the time when a process will have been discovered which will enable its being manufactured from clays such as we have at our very doors. Nay, if I am rightly informed, a series of very successful experiments have been carried on by French chemists and others of late by means of which that metal can be produced, but at a cost which, at the present time, is too great so that this aluminium industry cannot compete with that of iron. Those who are familiar with the properties of this metal will clearly see what advantages the community would reap if aluminium could be manufactured cheaply and from the clays which are so abundantly distributed with us.

And to sum up the results thus obtained in the examination of the Post-Tertiary deposits of Ottawa and vicinity, an ideal vertical section, made to include the various measures which compose them is here given:—It is taken from an actual section in the excavations on Waller street, near the corner of Rideau with that street. The lowest beds met are those beds of 'Boulder clay' or 'till' forest on which overlie the glaciated surface of the Trenton formation (Cambro-Silurian) below. Their thickness does not exceed five feet and are immediately overlaid by marine clay with fossils, and at times present a loose boulder or erratic "Leda clay" which some floating iceberg dropped on its way to warmer climes. The 'boulder clay' points to a period of considerable elevation of this part of the American Continent, when land ice covered the whole of this region. These "Leda clay" deposits point to times of submergence when the Atlantic Ocean extended as far inland as here, and when the shores of this sea were the Laurentide Hills, to the north and to the south the Adirondacks—shores which would have presented to an observer had he been there in those days, a similar scene which the barren coast of Labrador does now-a-days. The thickness of the clays varies very much in different places, at this particular spot it is only one and a-half feet thick and is overlaid by a thin bed of gravel, in turn overlaid by two strata of dark and light coloured sand respectively, which are separated by the bed of plant-remains, one inch thick, already referred to. These sandy or arenaceous strata though deposited on the shore or margin of an ocean or sea, point clearly to a period of elevation, which period has been going on ever since, so that this part of the American Continent may safely be said to be rising yet, at least in Eastern Canada, and until we have actual proofs of a submergence going on, a depression along the coast or an encroachment of tidal and other oceanic phenomena on the land, we may rest safely with the happy thought that we are on the upward move.

[There is a vast deal upon which it has been impossible to touch in a paper of this kind. I have only skirted the shores of the captivating subject before us, I have only glanced at some of the problems which press themselves upon us in examining the parts in question, I have barely touched and just stepped upon the threshold of Post-Tertiary Geology, which, *par excellence*, will form one of the most important subjects for geologists in the future.]

Geological Surveys.

In our last issue we drew attention to the importance and great value of this branch of Government work, but limited space prevented us from going so far into the subject as we desired. Comparing the last eight years of the amount of this work done in Canada with that done by the United States Government, and in addition to that the work done by the separate

States in former years and at present. The areas of Canada and the United States to be examined with the means thus appropriated. In area, Canada is larger, while the expenditure is very much smaller, and is done wholly by the Dominion Government, the several provinces spending nothing under this branch of the service. The Dominion, therefore, has reason to be complimented on the good results of so small an expenditure when the field is so wide in area and object, embracing, as it does, Natural History, and a Museum which does Canada honour and is well worthy of being enlarged to provide for the growing importance and necessities of this branch, altogether an institution of the highest educational and economic value. It must be remembered that in the United States amount, a museum has not to be included. The knowledge and good which has resulted from Geological discovery, in a general sense, expanding, as it does, our knowledge of the true order and condition of the earth, increasing human happiness and therefore lessening misery, in aiding the thinkers among mankind to the true system of creation or progression in nature, in liberating and enlightening the race from "the darkness of dream-land." When such good results have followed this system of discovery it is incumbent on our legislators to enact the best laws in order to receive its full educational and economic reward or value. Canadian Geological Survey including

	Nat. History Museum.	Civil Govt. List.	Total.
1879..	\$52,933.97	.....	.....
1880..	52,127.32	.....	.....
1881..	65,791.36	.....	.....
1882..	64,720.60	.....	.....
1883..	62,328.34	.....	.....
1884..	60,000.00	\$30,504.00	\$90,504.00
1885..	60,408.97	31,967.33	92,376.30
1886..	78,557.69	35,936.03	114,493.72

Through the kindness of the Hon. J. W. Powell, director of the United States Geological Survey, we are enabled to give the following statistics of geological work done in the United States.

	U. S. Federal expenditure during the years		
Fiscal year.	General Appropriation	Special Approp. for Salaries.	Total.
1879-80..	\$100,000	\$6,000	\$106,000
1880-81..	150,000	6,000	156,000
1881-82..	150,000	6,000	156,000
1882-83..	222,000	34,940	256,940
1883-84..	304,700	39,940	344,640
1884-85..	453,700	35,340	489,040
1885-86..	467,700	35,540	503,240
1886-87..	467,700	35,540	503,240

The appropriation for the fiscal years 1887-88 is the same as for the present year.

The following is the work done by the several states independent of the above amounts:—

ALABAMA.

There is a state geological survey in progress under the direction of Dr. Eugene A. Smith University, Tuscaloosa County, Alabama. It is supported by an annual appropriation of five thousand dollars for the period of ten years, beginning with 1882.

ARKANSAS.

A geological survey of this state was made 25 or 30 years ago by Dr. David Dale Owen, whose reports were published in two volumes, dated 1858 and 1860, respectively. No further official geologic work has been done in the state; but within a few weeks a new state survey has been established, with Professor John C. Branner as state geologist. The terms of the law establishing the survey are not fully known; but the salary of the state geologist is \$3,500.

CALIFORNIA.

There is no state geological survey in California, but there is a state mining bureau

which publishes annual reports. It is in charge of Mr. Wm. Irelan, jr. This bureau is supported by a special tax on the certificates of stock corporations. According to the report of the state mineralogist the expenditures for the fiscal year ending 15th May, 1885, were about \$7,800; and the appropriation and mining bureau fund for the period from April, 1885 to 1st October, 1886, was \$25,664.44, of which \$16,457.31 was expended.

COLORADO.

There has never been a geological survey of Colorado in any proper sense of the term. There has been for some years a state geologist who is not salaried and has no appropriation, but who is simply a mining engineer whose clientele is increased by his nominally official position.

CONNECTICUT.

There has been no geological survey in Connecticut for many years.

DELAWARE.

A geological survey of Delaware was made many years ago; and certain geologic investigations are now in progress, but without special appropriation, by the Professor of Geology in the State Agricultural College.

GEORGIA.

There is no regular organised geological survey in the state. Certain geologic investigations are, however, carried on by the Board of Agriculture.

ILLINOIS.

A geological survey of Illinois was completed some years ago at a total cost (including publication) of about \$190,000. Since the completion of the survey a small annual appropriation has been made for the maintenance of the State cabinet, and the curator of the cabinet (the ex-State Geologist) has done some original geologic work.

INDIANA.

The State survey is supported by an annual appropriation of five thousand dollars; but somewhat doubtful intelligence has just been received that this appropriation has been discontinued.

IOWA.

Two Geological Surveys of this State have been made under special appropriations, but the last was completed in 1870, since that date no official appropriation has been made.

KENTUCKY.

An official State Geological Survey is in progress under the direction of Prof. John R. Proctor, State Geologist, Frankfort, Ky., but the amount of the annual appropriation we cannot give.

MARYLAND.

There have been two or three Geological Surveys of Maryland, but these have been discontinued for several years.

MICHIGAN.

A geological survey has been maintained in this state for several years. It is supported by special appropriations. The present state geologist is Mr. Charles E. Wright.

MINNESOTA.

A state geological survey is supported by the income from the sale and rental of the salm lands of the state. The annual expenditure ranges from three to four thousand dollars; the aggregate from 1872 to the 1st August, 1884, being \$39,267.10. This does not include publication.

MISSOURI.

A geological survey of Missouri flourished from 1853 to 1873. It was supported by special appropriations for field work, salaries, &c., and printing which aggregated \$176,185.55. The survey was discontinued in 1876, and has not been re-organized.

NEBRASKA.

There has never been a regularly organized state geological survey in Nebraska; but some investigation has been carried forward indirectly under state auspices in connection with the state university—the professor of geology in that institution being authorized by the university authorities to devote a part of his time to original investigation. Thus the state indirectly pays at the present time about \$1,500 or \$2,000 per year for geologic work.

NEW HAMPSHIRE.

A geological survey of New Hampshire was prosecuted during the years 1869-78 inclusive at a total cost (including publication) of about \$60,000. The survey was discontinued in 1878, and has not been renewed.

NEW YORK.

New York was one of the first states of the union to institute a geological survey. The work of the original survey extended over the years 1837 to 1842, and included general natural history as well as geology. The cost of this work was about \$105,000. The results of the work were published at great length and in magnificent style at a total cost of over \$600,000, making an aggregate cost of work and publication on New York of about \$712,000. This includes all publications up to 1880. The survey proper was discontinued about 1842, and such geologic work as was performed was done in connection with the state cabinet of Natural History. About 1880, however, a survey was re-organized, a state geologist appointed and preparations made for the prosecution of geologic work. The amounts appropriated for the survey during the last few years are not known to us. The state geologist is Professor James Hall, of Albany, N.Y.

NEW JERSEY.

A geologic survey has been in progress in New Jersey for many years. In 1864 an appropriation of \$20,000 was voted for the purpose of making a geological survey of the state within four years; in 1869 a supplementary act was passed authorising the continuance of the survey for a further period of four years with an annual appropriation of \$5,000, and the appropriation appears to have been continued until 1876, when a further appropriation of \$8,000 a year for five years more was passed; and this appropriation in term appears to have been continued without definite action until 1885 when the Legislature made a further special appropriation of \$8,000 a year for five years more, by which time it is expected that the survey will be finished.

NORTH CAROLINA.

The last geological survey of this state was discontinued about 1878.

OHIO.

Two geological surveys have been made in this state—the second by far the more extensive. It was prosecuted during the period from 1869 to 1880 at a cost for field work, &c., of \$35,264; for salaries, office expenses, &c., of \$21,250; and for publications, &c., of \$249,272; or an aggregate of \$355,786. Since 1880 some special appropriations have been made for geologic investigation. The present appropriation is \$3,000 per year, and it is specified in the law making it that it shall be expended in investigations of the petroleum and natural gas resources of the state.

OREGON.

There is not now, and never has been, any regularly organized geological survey of Oregon; but some geological work is performed by the Professor of Geology in the State University at Eugene City, Professor Thomas Condon.

PENNSYLVANIA.

In this state, as in Ohio, there have been two important geological surveys. The cost of the first survey is not known to us. The second survey has been, and is yet, sustained by specific appropriations made by the Legislature at its biennial sessions. Up to 1885 these are as follows:—

Act of 1874.....	\$105,000
" 1876.....	65,000
" 1877.....	100,000
" 1879.....	50,000
" 1881.....	125,000
" 1883.....	50,000
" 1885.....	50,000

Total..... \$545,000

This does not include the cost of publication of reports which were issued by legislative order at a cost of about \$500,000 more.

SOUTH CAROLINA.

There has been no geological survey in this state for many years.

TENNESSEE.

A geological survey was completed about fifteen years ago, and has not been re-opened.

TEXAS.

There have been a number of important surveys in this state, but no official geologic work has been done for some years.

VERMONT.

There was a geological survey of this state many years ago.

VIRGINIA.

A geological survey of this state was made nearly half a century ago.

WISCONSIN.

An excellent geological survey of this state was made during the years 1873-79 at a cost for field work, &c., of \$74,000; and for publication, of \$75,000.

The Discoverer of Anthracite.

Anthracite was discovered in Pennsylvania in 1700, by Nicholas Allen. This Allen, according to the stories and traditions that have been handed down about him, must have been a kind of American Rip Van Winkle. He had come down from the Lake Champlain lumber region and opened an inn on the summit of the Broad Mountain. For a time he led a wandering existence, hunting, fishing, and lumbering, while his wife attended to the wants of thirsty travellers. In one of his hunting excursions he camped out at the foot of the Broad Mountain, at a spot where a coal vein cropped out, and, upon lighting a fire, was astonished at the intense heat it threw off. He also saw that some of the black stone had become red-hot. He dug some of it, and carried it home, when his wife, more practical than himself, pronounced it coal. They saw the coal crop out in abundance, and visions of fortunes that might be realized out of it flashed through their minds simultaneously. So, disposing of their effects, they loaded two large covered waggons with the coal, and set out for Philadelphia, with the intention of marketing it there and discovering its true value. They drove along the banks of the Schuylkill, sleeping in the open air at night. At Ports Town three of their horses died, and the coal was dumped into the river. Wearied and disheartened, the pair returned to the old place at the summit of the mountain, and shortly afterwards Allen laid his faithful wife to rest over the coal vein that proved their ruin, and turned his face toward the West, where, after an uneventful career, he enlisted for the campaign under Harrison and fell at Tippecanoe. — *Iron.*

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Mining Regulations

TO GOVERN THE DISPOSAL OF

Mineral Lands other than Coal Lands, 1886.

THESE REGULATIONS shall be applicable to all Dominion Lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, iron or other mineral deposits of economic value, with the exception of coal.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein either by surface or subterranean prospecting for mineral deposits, with a view to obtaining under the Regulations a mining location for the same but no mining location or mining claim shall be granted until the discovery of the vein, lode or deposit of mineral or metal within the limits of the location or claim.

QUARTZ MINING.

A location for mining, except for iron on veins, lodes or ledges of quartz or other rock in place shall not exceed forty acres in area. Its length shall not be more than three times its breadth and its surface boundary shall be four straight lines, the opposite sides of which shall be parallel, except where prior locations would prevent, in which case it may be of such a shape as may be approved of by the Superintendent of Mining.

Any person having discovered a mineral deposit may obtain a mining location therefor, in the manner set forth in the Regulations which provides for the character of the survey and the marks necessary to designate the location on the ground.

When the location has been marked conformably to the requirements of the Regulations, the claimant shall within sixty days thereafter, file with the local agent in the Dominion Land Office for the district in which the location is situated, a declaration or oath setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as aforesaid; and shall, along with such declaration, pay to the said agent an entry fee of FIVE DOLLARS. The agent's receipt for such fee will be the claimant's authority to enter into possession of the location applied for.

At any time before the expiration of FIVE years from the date of his obtaining the agent's receipt it shall be open to the claimant to purchase the location on filing with the local agent proof that he has expended not less than FIVE HUNDRED DOLLARS in actual mining operations on the same; but the claimant is required, before the expiration of each of the five years, to prove that he has performed not less than ONE HUNDRED DOLLARS' worth of labor during the year in the actual development of his claim, and at the same time obtain a renewal of his location receipt, for which he is required to pay a fee of FIVE DOLLARS.

The price to be paid for a mining location shall be at the rate of FIVE DOLLARS PER ACRE, cash, and the sum of FIFTY DOLLARS extra for the survey of the same.

No more than one mining location shall be granted to any individual claimant upon the same lode or vein.

IRON.

The Minister of the Interior may grant a location for the mining of iron, not exceeding 160 acres in area which shall be bounded by north and south and east and west lines astronomically, and its breadth shall equal its length. Provided that should any person making an application purporting to be for the purpose of

mining iron thus obtain, whether in good faith or fraudulently, possession of a valuable mineral deposit other than iron, his right in such deposit shall be restricted to the area prescribed by the Regulations for other minerals, and the rest of the location shall revert to the Crown for such disposition as the Minister may direct.

The regulations also provide for the manner in which land may be acquired for milling purposes, reduction works or other works incidental to mining operations.

Locations taken up prior to this date may, until the 1st of August, 1886, be re-marked and re-entered in conformity with the Regulations without payment of new fees in cases where no existing interests would thereby be prejudicially affected.

PLACER MINING.

The Regulations laid down in respect to quartz mining shall be applicable to placer mining as far as they relate to entries, entry fees, assignments, marking of localities, agents' receipts, and generally where they can be applied.

The nature and size of placer mining claims are provided for in the Regulations, including bar, dry, bench creek or hill diggings, and the RIGHTS AND DUTIES OF MINERS are fully set forth.

The Regulations apply also to

BED-ROCK FLUMES, DRAINAGE OF MINES AND DITCHES.

The GENERAL PROVISIONS of the Regulations include the interpretation of expressions used therein; how disputes shall be heard and adjudicated upon; under what circumstances miners shall be entitled to absent themselves from their locations or diggings, etc., etc.

THE SCHEDULE OF MINING REGULATIONS

Contains the forms to be observed in the drawing up of all documents such as:— "Application and affidavit of discoverer of quartz mine." "Receipt for fee paid by applicant for mining location." "Receipt for fee on extension of time for purchase of a mining location." "Patent of a mining location." "Certificate of the assignment of a mining location." "Application for grant for placer mining and affidavit of applicant." "Grant for placer mining." "Certificate of the assignment of a placer mining claim." "Grant to a bed rock flume company." "Grant for drainage." "Grant of right to divert water and construct ditches."

Since the publication, in 1884, of the Mining Regulations to govern the disposal of Dominion Mineral Lands the same have been carefully and thoroughly revised with a view to ensure ample protection to the public interests, and at the same time to encourage the prospector and miner in order that the mineral resources may be made valuable by development.

COPIES OF THE REGULATIONS MAY BE OBTAINED UPON APPLICATION TO THE DEPARTMENT OF THE INTERIOR

A. M. BURGESS,

Deputy Minister of the Interior.

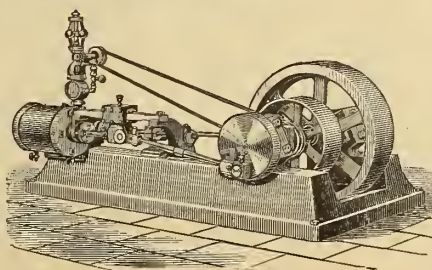
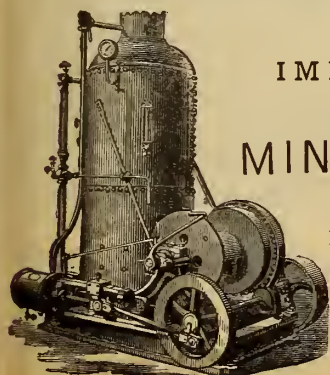
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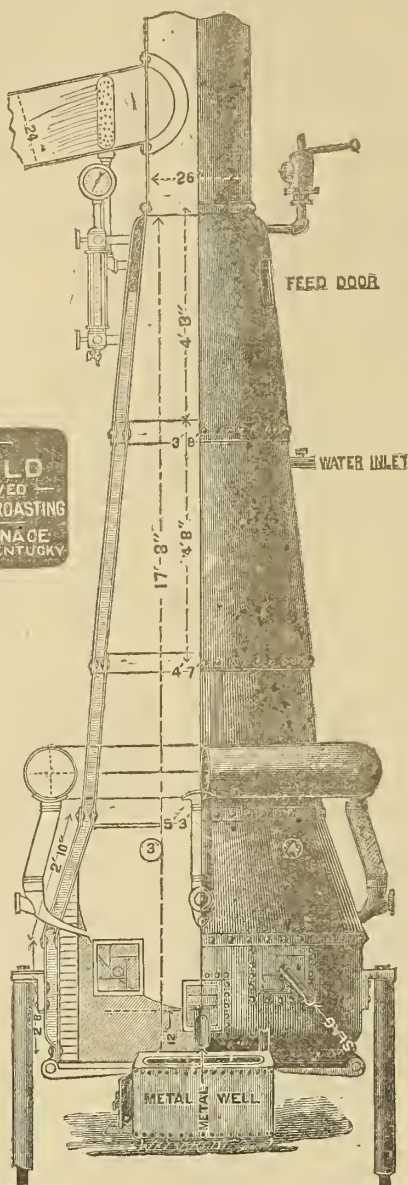
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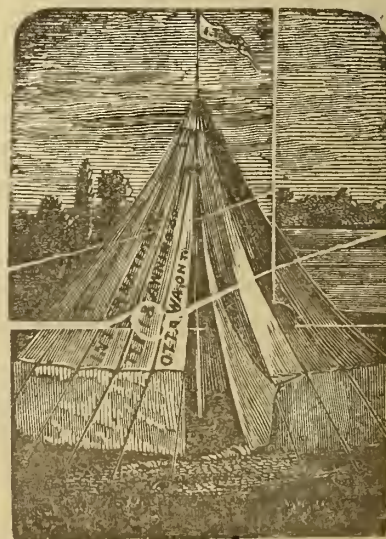
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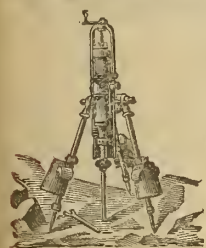
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Vol. V.—No. 4.

1887.—OTTAWA, JUNE—1887.

Vol. V.—No. 4.

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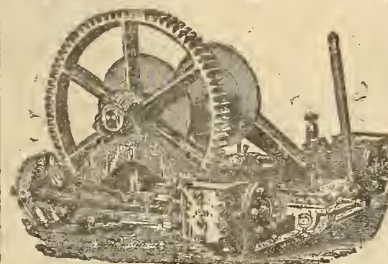
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Notice to Contractors.

SEALED TENDERS addressed to the undersigned, and endorsed "Tender for Superintendent's Residence at Experimental Farm; near Ottawa, Ont.," will be received until FRIDAY, 24th June next, for the several works required in the erection and completion of the

SUPERINTENDENT'S RESIDENCE AT
EXPERIMENTAL FARM, NEAR
OTTAWA, ONT.,

Plans and specifications can be seen at the Department of Public Works, Ottawa, on and after Friday, the 10th June next.

Intending contractors should personally visit the site and make themselves fully cognizant of the work to be done, according to the said plans and specifications, before putting in their tenders.

Persons tendering are further notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque made payable to the order of the Honourable the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party decline to enter into a contract when called upon to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

By order,
A. GOBEIL,
Secretary.

Department of Public Works,
Ottawa, June 2nd, 1887.



MAIL CONTRACT.

SEALED TENDERS addressed to the Postmaster General will be received at Ottawa until noon on FRIDAY, 5th August, 1887, for the conveyance of Her Majesty's Mails, on a proposed Contract for four years, six times per week each way, between

METCALFE
AND
OTTAWA,

from the 1st September next.

Printed notices containing further information as to conditions of proposed contract may be seen and blank forms of Tender may be obtained at the Post Offices of Greely, Leitrim, Billings' Bridge, South Gloucester, Ottawa, and at this office,

T. P. FRENCH,
Post Office Inspector.

Post Office Inspector's Office,
Ottawa, June 2nd, 1887.

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TENDER FOR THE WORKS OF CONSTRUCTION.

SEALED TENDERS, addressed to the undersigned and endorsed "Tender for Cape Breton Railway," will be received at this office up to noon on Wednesday, the 6th day of July, 1887, for certain works of construction.

Plans and profiles will be open for inspection at the Office of the Chief Engineer and General Manager of Government Railways at Ottawa, and also at the Office of the Cape Breton Railway, at Port Hawkesbury, C.B., on and after the 6th day of June, 1887, when the general specification and form of tender may be obtained upon application.

No tender will be entertained unless on one of the printed forms and all the conditions are complied with.

By order,
A. P. BRADLEY,
Secretary.

Department of Railways and Canals,
Ottawa, 27th May, 1887.



Department of Inland Revenue.

An Act respecting Agricultural Fertilizers.

The public is hereby notified that the provisions of the Act respecting AGRICULTURAL FERTILIZERS came into force on the 1st of January, 1886 and that all Fertilizers sold thereafter require to be sold subject to the conditions and restrictions therein contained—the main features of which are as follows:

The expression "fertilizer" means and includes all fertilizers which are sold at more than TEN DOLLARS per ton, and which contains ammonia, or its equivalent of nitrogen, or phosphoric acid.

Every manufacturer or importer of fertilizers for sale, shall, in the course of the month of January in each year, and before offering the same fertilizer for sale, transmit to the Minister of Inland Revenue, carriage paid, a sealed glass jar, containing at least two pounds of the fertilizer manufactured or imported by him, with the certificate of analysis of the same, together with an affidavit setting forth that each jar contains a fair average sample of the fertilizer manufactured or imported by him; and such sample shall be preserved by the Minister of Inland Revenue for the purpose of comparison with any sample of fertilizer which is obtained in the course of the twelve months then next ensuing from such manufacturer or importer, and which is transmitted to the chief analyst for analysis.

If the fertilizer is put up in packages, every such package intended for sale or distribution within Canada shall have the manufacturer's certificate of analysis placed upon or securely attached to each package by the manufacturer; if the fertilizer is in bags, it shall be distinctly stamped or printed upon each bag; if it is in barrels, it shall be either branded, stamped or printed upon the head of each barrel or distinctly printed upon good paper and securely pasted upon the head of each barrel, or upon a tag securely attached to the head of each barrel; if it is in bulk, the manufacturer's certificate shall be produced and a copy given to each purchaser.

No fertilizer shall be sold or offered or exposed for sale unless a certificate of

The Canada Co.

Will issue Licences to Prospect or to work Minerals on any of their Mining Lands and Mineral Reservations,

Covering nearly a

Quarter of a Million Acres

In Eastern Ontario, and principally within the belts containing

Iron, Phosphate, Gold, Galena,
Plumbago, Mica, Marbles,
Building Stone,
and other valuable Minerals.

For list of lands and terms apply to the Company's Mining Inspector,

H. T. STICKLAND,

PETERBORO, ONT.



TIMBER AND LAND SALE.

CERTAIN lots and the timber thereon situate in the Townships of Allan, Assiginack, Bidwell, Billings, Carnarvon, Campbell, Howland, Sheguiandah, Tehkummah and Mills on the Manitoulin Island, in the District of Algoma, in the Province of Ontario, will be offered for Sale by Public Auction in blocks of 200 acres, more or less, on the first day of September next, at 10 o'clock A.M., at the Indian Land Office in the Village of Manitowaning.

Terms of Sale.—Bonus for timber payable in cash, price of land payable in cash, a license fee also payable in cash and dues to be paid according to Tariff upon the timber when cut.

The land on which the timber grows to be sold with the timber without conditions of settlement.

For full particulars please apply to James C. Phipps, Esq., Indian Supt. Manitowaning, or to the undersigned.

No other paper to insert this advertisement without authority through the Queen's Printer.

L. VANKOUGHNET,
Deputy of the Supt. Gen'l.
of Indian Affairs.

Department of Indian Affairs,
Ottawa, 2nd June, 1887.



NOTICE RESPECTING PASSPORTS.

PERSONS requiring passports from the Canadian Government should make application to this Department for the same, such application to be accompanied by the sum of four dollars, in payment of the official fee upon passports as fixed by the Governor-in-Council.

G. POWELL,
Under Secretary of State.
OTTAWA, 19th Feb., 1886.

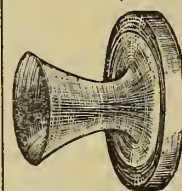
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The Canadian Mining Review

OTTAWA.

PUBLISHED MONTHLY.

ANNUAL SUBSCRIPTION \$1.00
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OFFICE:

UNION CHAMBERS, 14 Metcalfe St.

The CANADIAN MINING REVIEW, is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts, as well as others interested in Canadian Mineral Lands, are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 17th of the month.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

Advertising Space.

The circulation of the CANADIAN MINING REVIEW, which has steadily been going up since its first publication, more than five years ago, has now more than doubled the estimate upon which we had reckoned, and its value as an advertising medium to business men who wish to reach the best classes of mine owners and operators, and the mining centres and camps of every province in the Dominion, is consequently very greatly enhanced. The REVIEW is in the widest sense a Canadian journal belonging to all provinces alike; it is the only journal published in Canada wholly devoted to the interests of her mining industries and mineral resources. We would simply draw the attention of those who have hitherto overlooked it, to this matter, promising our best attention and most reasonable terms on any application for advertising space.

Iron and Phosphates.

At the recent meeting of the Royal Society of Canada we had the pleasure of listening to the address delivered to the mathematical, physical and chemical section by its President (Mr. Thomas Macfarlane). Some of the points touched upon seem to us to be of considerable practical interest.

After referring to the death of Dr. Baynes, a member of the section, and announcing as his subject the utilisation of waste in Chemical Technology, Mr. Macfarlane gave a description of the progress which had been made in this respect at the lead furnaces of Freiberg, in Saxony, and at the iron furnaces of Gartsherrie, in Scotland. At the latter place it seems that the furnace gases are made use of on a stupendous scale for the production of sulphate of ammonia, and for other purposes. In another department of the metallurgy of iron waste,

utilisations of a most important character have been accomplished, and to these Mr. Macfarlane referred in the following terms:

"Fifty-six years have elapsed since Karsten plainly pointed out the influence which certain small percentages of phosphorus exercise upon the quality of malleable iron. The presence of 0.3 up to 0.8 per cent. has the effect of making it "cold short," that is of lessening its strength at ordinary temperatures. This element is often present in iron ores in the shape of small quantities of apatite and other minerals, and when this is the case, as in 1840, the smelter has no means at his command for preventing the reduction of the phosphorus and its passage into his pig iron. In the original Bessemer process it was found utterly impossible to remove the phosphorus. All of that element present in the pig-iron stuck to the metal, while boiling white hot in the converter, passed into the steel ingots without the slightest diminution, and into the rails, axles and tyres, into which they were manufactured. It was found that for our modern purposes a much greater freedom from the weakening element was demanded than in Karsten's time. For rails 0.1 to 0.2 per cent. phosphorus was permitted, but for steel of a higher quality the pressure of one tenth of these quantities became the limit. As the demand for steel to replace iron increased, so also did the efforts of iron masters to apply cheap and inferior (because phosphoric) pig-irons in the production of Bessemer steel. The ores free from phosphorus were scarce, and, if we except the Cumberland hematites, had to be brought to England from Spain, Algiers and Sweden.

"At last in May, 1879, the problem was solved by Bolckow Vaughan & Co., at Middlesborough, who were the first to carry out the invention of Thomas & Gilchrist, since become famous as the "Basic process." By making use of a basic lining of bricks in the converter, containing not more than 10 per cent. silica, manufactured from dolomite with silicate of soda as a binder, and employing a basic slag containing not more than 20 per cent. silica, and continuing the "blow" 2 or 3 minutes after the removal of the silicium and carbon, those inventors were able to reduce the phosphorus in common pig iron 1.5 to 0.4 per cent. and drive it as phosphoric acid into the basic cinder. The consequences were far reaching. Inferior ores and pig irons became available for making Bessemer steel, and great reductions have taken place in the price of rails, of which our new railways have had the advantage.

"But these were not the only consequences of this invention. Chemical manufacturers began to face the question as to how the phosphoric acid thus separated could be made use of. Large quantities of Thomas & Gilchrist slag were accumulating at the steel works in England and elsewhere, and it was found to contain from 16 to 20 per cent. of phosphoric acid. Compared with our Canadian apatite it seems to be a meagre raw material for fertilizers.

Nevertheless it was used for making these, and an article called Thomas' Precipitate was put upon the market by German manufacturers. But before this business had time to develop, it was found that by applying the slag itself as a manure, without any preparation beyond grinding to a very fine powder, the most satisfactory results could be obtained. The problem of utilising it has, therefore, been attacked and solved, and the phosphorus which, for fifty years, was the dread of the iron-master, has now no terrors for him, and has reached at last a sphere of widely extended usefulness in agriculture.

"It would be rather an undesirable result if this saving of waste should have the effect of reducing the value of our apatite deposits. Yet the most recent investigations point in this direction. In the *Chemiker Zeitung*, of March last, the following ultimate analysis of the Thomas slag is given:—

Phosphoric acid.....	19.02
Silica.....	8.20
Manganous oxide.....	5.24
Ferrous oxide.....	8.06
Ferric oxide.....	5.14
Lime.....	49.60
Sulphur.....	0.60
Magnesia.....	3.40
Alumina.....	1.10

100.66

"Small crystals having been discovered in the slag possessing the composition of Quadrobasic phosphate of lime, the proximate composition of the slag has been computed from the above analysis with the following result:—

Quadrobasic Phosphate of	
Lime.....	49.02
Silicate of Lime.....	15.85
Lime (uncombined).....	11.00
Sulphide of Calcium.....	1.35
Manganous oxide.....	5.24
Ferrous oxide.....	8.06
Ferric oxide.....	5.14
Magnesia.....	3.40
Alumina.....	1.10

100.16

This view of its composition is supported by the fact that the slag is decomposed with facility by dilute acids, and further 8.7-8 per cent. of its phosphoric acid is soluble in a solution of Citrate of Ammonia, a circumstance that would indicate its agricultural value to be equal to that of the precipitated or reverted phosphoric acid of artificial fertilizers. This is just what field experiments with it, in an extremely fine condition, have proved. Its agricultural value has been found to be equal to the phosphoric acid contained in Thomas Precipitate or bone ash.

"With reference to price it is calculated that one pound of phosphoric acid, contained in the finely ground basic slag, can be delivered for about one penny. If we take the value of 80 per cent. apatite in Liverpool at 10c per unit., or about $\frac{1}{2}$ per lb. of tribasic phosphate, then the price of the phosphoric acid in it amounts to very nearly 1d. per lb. This is the same price, but a great difference lies in the fact that

while the slag is ready for the uses of the farmer, the apatite is not, and its phosphoric acid has still to bear the cost of manufacture. One pound of phosphoric acid contained in high grade super-phosphate, made from Canadian apatite, cost in 1886 $2\frac{4}{10}$ pence. From this and from the experience gained in Scotland and Germany regarding the relative agricultural value of soluble, precipitated and slag phosphate, it seems plain that making super-phosphate will soon become a thing of the past, and that our apatite miners will require to seek some new method of applying their mineral to agriculture, so that it may be able to compete with its new rival—the Thomas & Gilchrist slag. This is a problem to which our chemists and agriculturists should address themselves with the least possible delay. Very likely, by melting apatite with basic fluxes and grinding the product extremely fine, a material might be produced capable of direct and advantageous application to crops."

There were numerous other important subjects brought up in Mr. Macfarlane's address, but this matter of iron and phosphates seems to us to have a special interest for our readers, and we have, therefore, placed it before them in detail.

Is Mining a Risky Business?

The lottery is declared unlawful because it dissipates the earnings of the people, but compared with it the game of chance now played in the Ontario and Quebec Land offices under existing laws and mode of locating a claim with reference to a discoverer obtaining the reward of his labour, the lottery is an honest and seemingly legitimate business. Its patrons risk only the price of a ticket, and it is win or lose and the amount lost is known but not so with the application for a mineral lot in the Provincial Land Office, where profits to be derived, from labour and prospective value are lost along with the labour and expenses of discovery added. We want a new and more just code framed so that by making the location of a claim or discovery *on the ground in a proper manner first* (and then at the Land Office) imperative, the discoverer will receive the just reward of his labour.

Protection Wanted.

An American exchange commenting upon the wholesale destruction of life at the Nanaimo mines very properly suggests that more protection should be accorded to miners in deep shafts than has heretofore been given them:—

"Many of the coal mines on the coast have been worked as cheaply as possible, owing to sharp competition—so it is alleged—and due security has not been provided for, either in timbering the mines or in furnishing modes of escape in case of fire or caving in of shafts. One shaft is not enough in any mine, any more than a single stairway is sufficient in a mammoth hotel. There should be some law to protect the lives of labourers in mines providing for means of escape, &c. Laws of this kind do prevail in some places. They should be more universal. In default of such legal protection, the labour associations might restrict their members from labouring where proper safeguards are not provided."

Our Mines and Minerals.

W. A. Carlyle, Montreal.

Facing a sea of details and technical terms, understood only by the initiated, it has been difficult to make this subject generally instructive and popular. Still this part of the great natural resources of Canada cannot fail to excite deep interest among those who are studying the wealth and power of our country.

When we begin to write about the mines of Canada we have before us a vast extent of territory, as the name *Canada* is no longer confined to a narrow strip of country along the River St. Lawrence and the great lakes, but from ocean to ocean, from the turbulent Atlantic to the calm Pacific, rings out the name Canada; and then dies away in the vast regions of the North and the Arctic Ocean.

Everywhere throughout the different provinces people are flocking to establish new homes; and great regions, not long since the home of savages, are beginning to blossom with the labor and industry of the white-man's civilization, while the cheerful whistle of the locomotive re-echoes through the valleys and across the prairies of that which no longer can be called the "Great Lone Land."

From the beginning it must be remembered that Canada can scarcely be regarded as a metalliferous country of explored richness, although her mines are numerous and extensive, only awaiting energy, capital, and a more favorable state of the markets for their development. Canada has been gifted with almost every natural wealth, but the vast forests are fast melting away before the choppers axe to satisfy demands from all parts of the world, and the time is not far distant when this seemingly inexhaustible supply of timber will fail, and other regions and new countries must become the sources of this commodity. The fisheries seem an illimitable source of wealth as periodically the deep gives up its revenue, paid in gigantic swarms of fishes, but even here experience teaches that these great harvests may be devastated and ruined. The mineral wealth of this country will yet become of greater value as the demand increases and railroad and other facilities improve, though at present many mines remain idle and undeveloped.

If you will permit me to briefly state a few well-known facts concerning the geology of this continent it may aid to a better understanding of our subject, as mineral deposits are not scattered about hap-hazard, but are always found under certain circumstances and in certain localities.

It is doubtless that in the beginning the globe was in a molten state, and eventually, becoming cooler, a hardened crust was formed, which in turn was violently bent and folded as the cooled surface contracted, thus pushing up great ridges that since have become the nuclei of all mountain ranges. As the temperature decreased the vast impenetrable and enveloping cloud of vapor dissolved into rain, and oceans and seas, rivers

and brooks were formed, which, aided by heat and frost, began their attack on the great rock masses, wearing and grinding them into sand and mud, which, carried out by the waters, were spread over the vast ocean floors. In studying rocks, it is seen that the granites and gneisses, such as form our great Laurentian hills, are the oldest known, forming as it were the floor of the earth, or the lowest part of the rocky crust; and by their disintegration and crumbling away there have been built the great deposits of newer rock, thus sand and mud have been consolidated by intense heat and pressure into sandstone, slates and limestone. These newer rocks can be readily distinguished as they lie in layers or strata as one bed has been successively deposited upon the other, while in most of these strata are the fossil remains of animals that lived myriad years ago, the great primeval oceans having been the birth-place of most of them. Glancing at a map it is seen that along the eastern and western coasts of the continent are two great mountain ranges, the Appalachians and the Rockies, while between extends a great inland sea or plateau. When geologists examined these ranges the startling discovery was made that the great mountain masses, whose peaks often towered 10, 12 or 13,000 feet high, consisted greatly of those stratified rocks all twisted and piled up on end, and on the loftiest summits were found the fossil remains of animals, whose shells buried in the mud and sand of ancient ocean bottoms, were firmly imprisoned when these were hardened into stone.

After careful observation the secret of this enormous uplifting from ocean depths to mountain summit was learned from the fact that the beds of the Atlantic and Pacific oceans had subsided, and being very strong and firm, on sinking down had pushed with profound force against the more yielding continental masses, forcing up into these mountain ranges the great areas of rock. During the past four years Dr. Dawson has brought to light many more marvellous facts concerning the building up of these Pacific coast ranges. It has been found that there are four distinct ranges: (1) the Rockies, (2) Gold range, (3) Coast range, and (4) a submerged range, of which Vancouver and Queen Charlotte Islands are summits, and by the different ages of the constituent rocks it has been proved that these ranges have been formed at different periods, and the most inland, the Rocky range, is the youngest. To push up the towering heights of this great mountain chain, natural forces have been so great, the shoving energy of the Pacific Ocean bed has been so terribly grand that these deeply-rooted mountain ranges, the Vancouver, Coast and Gold ranges, over 400 miles in width, have all been pushed bodily towards the east, folding up inland plateaus into the grand precipitous cliffs and precipices of the Rockies.

All this is pertinent to our subject, as in these disturbed regions are found the great mineral deposits, collected mostly in great

cracks or fissures made by the bending and distortion of the rocks. To these great earth movements are due the differences in the coal measures. Coal beds are the remains of forests that flourished under such favoring climates that some plants, now seen as small club mosses, then grew as trees, while all vegetation grew in rank luxuriance. These great forests were finally submerged by the encroaching seas, and upon them were piled great depths of sand and debris, crushing down these deposits of vegetable matter into the hard black coal. Where this has lain undisturbed by those earth movements, as in the prairie beds of the North-West, the coal or lignite is poor, soft and watery. Where subjected to some upheaval or twisting the quality, known as soft coal, is much better, but where the beds have been all twisted and crushed, as in the mountains of Pennsylvania, the oily and volatile matters have been passed out, leaving the hard, shining hard coal or anthracite. In Canada anthracite coal is found only in Vancouver Island or along the Pacific coast, while that of the prairie province is poor until the mountains are approached.

The principal ores of Canada are gold, silver, copper and iron, and, though very valuable mines are known, yet none are startling in their extent or value when compared with those of Australia, Spain or the United States. Much capital has been spent upon their development and much has been lost, partly through ignorance and blundering, and partly through natural disadvantages and insuperable competition. One expert has said:—"that among the industrial enterprises begun from time to time in our Dominion few have been more unsuccessful than seeking the development of her vast mineral resources. The fault being not always through lack of mineral, but more often through blundering and inexperience on the part of the operators."

The rapid settlement of our country and the wide extension of the railroad system are beginning to make the opening up of good mines, long known, possible, while their value is rapidly increasing as the promises of better profits brighten. One thing to be deplored is that at present much of the energy and capital being expended in Canadian mining is American and not Canadian.

In this age of iron, now but at its dawn, when the use of this invaluable economic metal is spreading throughout all the branches of the arts of men, fast superceding timber and stone in many industries, the iron mines of Canada have attracted much attention. The present annual importation of iron and steel exceeds \$15,000,000, while since confederation \$235,000,000 of foreign metal has come into Canadian markets. The question has often been raised why do our own iron beds not supply this growing demand. The great reason is that the cost of smelting or converting the ore into iron or steel is much greater than in some other countries, as Britain or the United States, from two causes—

I. The foreign iron beds are much vaster in extent;

II. The want and greater cost in Canada of suitable fuel.

In the United States some of the most valuable mines are found in rocks the same as comprise our Laurentian Hills, and all so extensive as to seem practically inexhaustible, some producing from \$500,000 to \$1,000,000 worth of iron annually. With such deposits it is safe to erect the very extensive mills and blast furnaces, which alone can now be profitable. Many of these noted mines are found in and near the great coal fields, in fact, in some rich mines, beds of iron are in direct contact with beds of coal. This is a great factor in iron mining, as it requires 2,000 to 3,000 tons of coal for smelting 1,000 tons of iron ore. Under such favourable circumstances, when coal can be got for the cost of the mining, good iron can be profitably sold at one cent a pound. Remembering these facts, and the intense competition among the great American Iron Corporations, the position of Canadian iron mining may be better understood.

In Ontario and Quebec iron has been mined in many different places with varying success, the ore being smelted at the mines or shipped to American furnaces. But the dearth of cheap coal and poor means of access have made this enterprise barely profitable. North of Lake Ontario are several mines as the "Coe" mine near Wollaston, from which 45,000 tons of ore were shipped to Cleveland from a vein of very pure ore 20 to 40 feet wide. At Bedford, in Frontenac, is a rich bed 100 feet thick, while several are near Madoc, one yielding 40,000 tons of ore.

In Quebec, furnaces have been worked at St. Maurice, near Three Rivers, since 1737, while good beds are known at Bristol, Sherbrooke and Leeds, and at Moisu are great beds of iron sand that, however, proved unprofitable. In the Laurentian rocks at Templeton and Hull are rich deposits, and it is not at all improbable that very rich finds will yet be made in these rocks when this country becomes more cleared. Iron is found, of economic value, around the shores of Lake Huron and Lake Superior, and in British Columbia rich mines are known near excellent coal fields. On Lexada Island are deposits 25 feet thick, while the coal beds of Comox Harbor are only 20 miles distant, but the industry in this part of Canada awaits the increasing demands of a much larger population. But it is in Nova Scotia, along its northern part, that the best Canadian iron beds are found in large veins intersecting rocks of all ages. The coal fields are close at hand, with every facility for shipment, but after many spasmodic attempts these mines are now almost idle, unable to overcome the great foreign competition.

Furnaces have been built, but the history of iron-smelting in this Dominion is neither a long one nor a brilliant one; the list of failures is greater than the list of successes, but such is

likely to be the case where enterprises are too often undertaken by persons of little or no experience.

To be continued.

The New Tariff.

(Iron Trade Review.)

The best possible tribute to the wisdom and efficiency of the present American tariff is the fact that Canada has adopted a system modeled very closely upon it and differing chiefly in the fact that it levies about two-thirds of our duties upon articles entering that country. The revised and amended schedule on iron and steel products appears on another page, but it may be interesting to bring into comparison herewith some of the principal articles in the schedule, under the old and the new duties:

	Old Duties.	New Duties.
Pig iron.....	\$2 per ton	\$ 4 per ton
Slabs, blooms, puddle bars...	Not specified	9 "
Bar iron.....	17½ per ct.	17 "
Flats, 1 in. wide and less.....	17½ "	13 "
Round iron, 7-16 to ¾ in. diam.	17½ "	15 "
Round iron, less than 7-16 in. diam.....	17½ "	25 per ct
Iron and steel boiler plate.....	12½ "	30 "
Malleable iron and steel castings.....	25 "	\$25 per ton
Cast iron plates and vessels.....	25 "	16 "
Cast iron pipes.....	30 "	12 "
Sheet iron, below 20 gauge.....	12½ "	12½ per ct
Hoop or band iron.....	Not specified	\$12 per ton
Rolled channel and T iron.....	12½ per ct.	12½ per ct
Iron bridges and structural iron.....	25 "	1½c per lb
Iron and steel forgings.....	25 "	1½c "
Wrought iron and steel scrap.....	Free	\$ 2 per ton
Steel ingots, blooms, &c., 4c or less per lb.....	12½ per ct.	30 per ct.*
Steel ingots, blooms, &c., above 4c per lb.....	10 "	12½ "
Wire rope.....	25 "	25 "
Hardware.....	30 & 35 "	35 "
Firearms and surgical instruments.....	20 "	20 "
Cut nails and spikes.....	10 per ct and ½c per lb.	1c per lb
Street railway rails.....	75 per ct.	\$ 6 per ton
Safes.....	25 "	35 per ct

*But not less than \$12 per ton.

The re-adjustment of rates has proceeded upon the theory that Canada has iron ore and coal in close proximity to each other and special facilities for the production of charcoal iron, and that the exclusion of foreign products would be more than compensated by the resulting growth of the Canadian iron and steel industry. The annual Canadian consumption of pig iron is 250,000 tons, not inclusive of steel rails. To make this quantity in Canada, 750,000 tons of iron ore, 120,000 tons of limestone and 750,000 tons would be required, and considering the benefit which would accrue to the country by the development of the iron industry the Government felt that it was justified in losing the coal duty of half a million.

The United States has little to lose by the new arrangement, and it would certainly be in bad grace to characterize the present policy otherwise than as pre-eminently politic on the part of our neighbour. May she reap great national and material results from the new system.

Coal Dust in Mines.

Some time ago there appeared in these columns the report of a valuable paper on this subject read by Mr. M. Mercier before the Manchester Geological Society. The following discussion on the paper took place at a recent meeting of the organization and is full of interest to our readers:—

Mr. J. S. Burrows said Mr. Mercier had dealt with several means for lessening the quantity of dust in a mine. He (Mr. Burrows) had since

been looking into the question, and it seemed to him that in places where the haulage was done by machinery they had to face conditions which must of necessity cause a large quantity of dust to rise from the tubs. He had found that when the roads were packed the dust had gone a long way into the pack and lodged there. He had swept one piece of road, but in less than a week it was fully coated with dust. He had tried water on a small scale, and he found that unless he put on a heavy quantity it simply ran away in little globules. If they put on a large quantity of water they wet the timbers, they made the roads slippery, and would no doubt eventually cause the floor to lift. In his opinion the real danger which arose from the presence of dust in a mine would be best overcome by providing some substitute for the use of gunpowder, rather than take so much trouble as would be necessary to get rid of the dust.

Mr. Mawson said the idea of having water pipes laid down along the roadways seemed to be a good one, but it would entail very great expense and he thought would be found hardly practicable in mine. The best suggestion was to have a water tank carried like a tub along the roads, which would discharge the water through a rose.

Mr. Burrows thought such an arrangement would require an enormous amount of water if they were to effectually lay the dust.

Mr. Mawson suggested that if the dust were once properly swept up, and the water tanks used, the road might be prevented from getting dusty again.

Mr. Burrows, as an illustration of the quantity of dust that was constantly accumulated mentioned that in one double road 900 yards long, they filled at least 18 tubs every night with dust, and in addition to this they had extra cleanings up.

Mr. Hall, Inspector of Mines, thought that they might be able to prevent the dust blowing off the tubs by sprinkling the tubs with water as well as the roads. The dust question was a very important one and would have to be tackled in some shape or another. He had been reading a description of a water-sprinkling machine brought out in the North of England which could water 800 yards of road with less than a thousand gallons of water; this was a tank that went on wheels with a longitudinal tail from which the water was discharged. He thought colliery managers sometimes overdid the difficulty of watering mines, so far as lifting the roads was concerned. There was no doubt a good deal of difficulty in some kinds of roads, but if they persevered with the water and got the temperature something like regular, this difficulty would cease.

Mr. Burrows did not think that sprinkling the tops of the tubs with water would prevent the dust rising.

Mr. Mercier said in watering the roadways the idea was not so much to soak the dust as to have a fine spray thrown into the current of air. It would be almost impossible to saturate the dust, but if the moisture were carried along on the air it would effect the purpose. He did not think, even with a soft warrant floor, that if the water were simply mixed with the atmosphere it would affect the floor to any extent. With regard to the dust blowing off the top of the tubs this was a difficulty which might be very considerably overcome by improving the roads and using closed tubs. At one colliery in South Wales where they had been blocked with dust when using open tubs, by adopting the means above stated they had been able to reduce the dust about two-thirds. He thought the pit tubs had more to do with the dust ques-

tion than anything else, and where iron boxes had been introduced the mines were nothing near so dusty as where wooden boxes were used. In using a water cart a considerable difficulty was in getting into the return roads, and the laying down of the requisite lines of rails would, in some cases, cost quite as much as putting down water pipes by which the mine could be watered automatically. He might add that at one colliery they used compressed air with the water so as to get a very fine spray.

Mr. Burrows admitted that there was a good deal in what Mr. Mercier had said with regard to bad tubs, but whatever they did they could not prevent the dust shaking out.

The Chairman said the whole question was one of great interest to colliery proprietors. The other day he had a conversation with Mr. Wm. Galloway who was a well known authority on the dust question, and he said the practice of watering the roads was largely on the increase in South Wales, but he also strongly recommended that the tubs should be made as dust proof as possible. He further expressed the same opinion as Mr. Hall, that the coal dust question was one which would have to be gone into thoroughly, and if this was done, he was satisfied good results would follow.

Mr. Burrows suggested that but for the danger of explosion attendant on shot firing the coal dust question would not be regarded as being of such great importance.

Mr. Hall remarked that shot firing was not the only cause of explosions, and that whilst there were other contributory causes, the presence of coal dust in the mine must always be a danger and render it desirable that the dust should be got rid of.

The Chairman observed that some persons held the opinion that an explosion might be caused by coal dust alone without the presence of gas. He did not hold that theory, and in his opinion it was impossible to have a serious explosion without the presence of gas. In some of the extensive collieries in South Wales, they might find in almost every case a "cap" in the main return, and the colliery officials would tell them that this was dust, and it was one of the reasons they went for the coal dust theory.

Mr. Mercier remarked that if the mines inspectors in South Wales were of the same opinion as the colliery officials on the coal dust theory, it was time there was a change.

Geology of the Gold Regions.

How the Ancient Streams of the West Developed its Auriferous Placer Deposits.

From a paper read before the Royal Society at the Annual Meeting at Ottawa, May 27th, 1887, by Amos Bowman, Mining Engineer, of the Geological Survey of Canada.

We extract from Mr. Bowman's paper, read before the Royal Society, the following description of one of Nature's most interesting operations, which will be best understood and appreciated by those who have been actually engaged in gold mining in the Western or Rocky Mountain regions of the Dominion.

Mr. Bowman's paper covered the general subject of the Gold Bearing Rocks of British Columbia, about to be reported upon by the Geological Survey, and gave introductorily a general view of the field described and its geological problems. This was followed by an account of the different formations found to be gold bearing, that is to say, the distribution in time of the gold bearing rocks; then of the geological distribution of the productive regions

overrun since 1858, and the formations to which they belong. The succeeding portion on "mechanical enrichment, its methods and degrees to a stage adapted to placer mining and the natural forces at work," is what we have here copied.

The paper continued to consider the processes of chemical enrichment, the results of which are witnessed in the quartz veins of the country, having for its ground material the deep water sediments, commonly described as slates, which were off shore palaeozoic sediments adjacent to very ancient crystalline areas; and concluded by a description of some of the most noteworthy features of the cordilleran system in Canadian territory; being accompanied by a map and six sections.

The Natural Forces at Work.

CONDITIONS OF PLACER MINING.—Great wealth in gold may still exist, however, where placer mining has not been successful. This will become apparent when I point out the operation of the natural causes of workable placers; and will form a significant comment upon possible gold countries which are not placer mining countries, such as the Appalachian gold regions.

Three circumstances have to combine to make a good placer-mining region: first, the veins must carry free gold along with the baser metals; secondly, the conditions of natural concentration in streams must have operated upon them; and thirdly, after such operation, the product must be accessible to the miner. Either of these conditions wanting, though we walked over untold millions, we could not realize it by successful placer-mining. In California all three of these purely geological considerations happened to be superb. In British Columbia they are not exactly identical, as I have elsewhere pointed out.*

SILTING UP OF STREAMS.—A peculiar circumstance pertaining to profitable placer mining regions is to be observed in connection with this silting up or filling of previously eroded canons, I refer to its universality in all the famous gold mining regions. Hence it has occurred to me that I should perhaps have included it among the above mentioned necessary natural conditions of placer forming. The process appears to have served as a means of arresting the gold. In its absence the gold would have been hammered between the boulders along with which it travelled, and the bed rock of the stream, until it became flattened and frequently sub-divided. By continued erosion and undermining this process of hammering and subdivision would of course be continued indefinitely, until it is readily conceivable that all the gold entering a river would, unless otherwise retarded, be carried down stream, and finally scattered again among the sediments of the plain.

CAUSES OF SILTING UP STREAMS.—The silting up of the old river channels was due to a cause which can be very precisely stated, viz:—An alteration in the transporting power of running water, from greater to less. It arose from a different combination of its two factors of *Volume* and *Grade*. Prof. Whitney has attributed all of it to a change simply of volume. Prof. Le Conte has attributed all to a change only of grade. Both have drawn important conclusions regarding climate and uplift. As it is plainly a resultant of these two factors it appears to me that the geological problem involved is a more complicated one than has been assumed.

*Address before American Institute of Mining Engineers at Scranton meeting, February, 1887.

Method and Degree of Mechanical Enrichment to a Stage adapted to Placer Mining.

The tertiary streams of the north-western Pacific coast were silted up, as has been stated, and covered in some places by lava flows, in others directly by post pliocene glacial clays and drift. Examples are seen of the former in the chasms of the "Green Timber," on the Cariboo road, and in the bluffs of the Pentateucent river, opposite Quesnel; and of the latter in every mining camp in Cariboo.

As the silted gravels were derived from the adjacent older formations, which have been described, it is proper to remark in this connection that the distribution of the auriferous deposits is nevertheless not necessarily co-extensive with the gold bearing rocks. It was limited by the conditions necessary to bring about the phenomenon of silting or filling up with detritus, taking the place of preceding conditions of erosion and transportation. Usually this occurred *only for a short distance* along the course of the older eroded valleys. The effect is very striking in placer mining regions. Down stream they are represented by sands and clays, containing very much less gold, as well as gravel, than in the deepest part of the cycloid of erosion.

POST-TERTIARY AND RECENT ENRICHMENT.—In the post-tertiary, or rather recent period, concentration of gold into workable placers took place, generally speaking, only in the silted up river valleys. Its method was that of replacement, and sorting of the material of the bench or terrace epoch. This could not have taken place to any great extent during the post-tertiary Terrace epoch; because the raw material so to speak, was only then being deposited, and it was upon this that concentration did its work. *Itself* had buried all the pliocene concentrations out of sight, and out of reach of the flowing waters of that valley-filling period. Examples were found in all the early diggings of 1858-9 along Fraser river.

INTERVENING OF THE PLATEAU LAKE PERIOD.—The transformation of valleys into lakes, and the confluence of lakes into one or more inland seas of vast proportions—from causes not yet satisfactorily explained—put a stop to the effective concentration of gold until the turning point was reached at the close of the pleistocene (post-tertiary), when the filling had been completed, and eroding conditions were once more established. Any one who has seen the map of British Columbia, and still more, any one who has seen the country itself will recognize the far reaching and general importance of this plateau lake period by its remaining and enduring landmarks.

THE "BED ROCK" MISSED AND FOUND.—Nearly all the benches and washes of the Fraser and its tributaries, profitably mined by the placer miners after 1858, and by the Chinese and Indians in subsequent years, accordingly belong to Recent time. No bed rock was reached by the early miners of British Columbia until they got into the higher mountainous region of Cariboo, where the recent erosions had tapped some of the higher bed rock channels left intact on the sides of the older valleys during their erosion. They are known among the placer miners as bed rock benches, or "high channels," and are generally understood by the miners themselves to be older in date than the deeper deposits of the tertiary streams. Examples are universal in any mining country.

OLDER AND NEWER TERTIARY STREAM CHANNELS.—Similar bits of streams running on bed rock were often not older, however, than the recent erosions, as is frequently seen where

the recent eroding stream had been displaced by a slide. It is true, however, that the highest old side channels were, generally speaking, the oldest. They are all hidden in Cariboo District by a universal covering of drift.

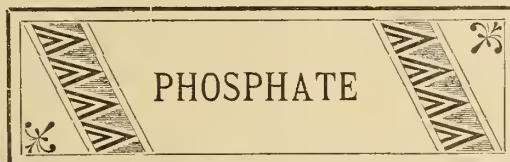
The deepest channels cut during the tertiary period are in Cariboo generally from 40 to 120 feet underneath the present stream beds, and separated from the stream concentrations, of recent date (like those of the Fraser), by beds of clay marking the separation between pliocene tertiary, and pleistocene or older post-tertiary. Nothing is more important to the process of drift mining, or better known to the miner than the "clay." It sometimes "gives out," to his grief, from removal by a side stream or other causes; in that case involving much pumping or expensive working.

WHY THE TERTIARY STREAM BEDS ARE RICHER.—Now these older channels of the tertiary period which ceased cutting and began filling, as already remarked about the close of that period, necessarily contained in their deepest gutters the accumulated gold of the entire tertiary eroding period. The history of the concentrating process accounts for the richer placer deposits in most cases.

The bulk of the gold has been taken out in Cariboo District accordingly by drifting.

Not only less time, but much less disintegrated country rock was represented in the recent erosions which terminate in their downward wear above the clay.

It would seem incredible were it not a fact that in less than two years after the commencement of gold mining in British Columbia, near Hope, the perseverance and ingenuity of the California prospector had actually explored and exploited the valley of the Fraser river for a distance of four hundred miles from the starting point, at Hope, into the interior of British Columbia, and as early as the fall of 1860 had penetrated the hidden mystery of the tertiary streams, and found therein what he was seeking. The wealth of Keithley, Harvey, Cunningham, & Antler creeks was quickly disclosed. Soon after them followed the famous discoveries on Williams & Lightning creeks. They were successively revealed by accidental bits of "shallow bed rock," along with a good deal of shrewdness, on the part of the prospector, directed to a solution of the problem.



Latest English Quotations.

London advices report that the market during the past month has been without any special feature, the only exceptions being the large sales of South Carolina Phosphates, and the demand which has arisen for Sulphate of Ammonia.

MINERAL PHOSPHATES.—There is no material change in Canadian, but as the St. Lawrence is again open to navigation, dealers anticipate a renewed interest in this high grade Rock. A very large business has been done in South Carolina Phosphates, as owing to a number of steamers arriving at American Ports without profitable employment, they became available at unprecedentedly low freights for bringing home Phosphate, and most of the large manufacturers were able to secure supplies at about 6½ l. to 7 d. per unit, delivered at U.K. Ports. Belgian

Phosphate has been in active request since our last, and several contracts have passed both for immediate and next season's delivery, but at ruinous prices for the raisers. Messrs. Couper, McCarnie & Co. are offering all qualities from 20 to 25 per cent. to 60 to 65 per cent. Sonme Phosphate still remains actively in demand, and raisers are unable to keep pace with it, though with the fine weather many of their difficulties will be removed.

The following shipments of Canadian ore have been made from Montreal for month ending 31st May last:—

Date.	Shippers.	Ship.	Destination.	Tons.
May 18.	Wilson & Green.	s.s. Ovenholme	Liverpool.	613
" 23.	Gillespie, Patterson & Co.	s.s. Bannewall.	Hamburg	104
" 25.	Anglo Canadian Phosphate Co.	s.s. Colina.	Glasgow.	200
" 27.	Wilson & Green.	s.s. Carropus.	Liverpool.	63
			Total....	980

Latest quotations in England for Canadian Phosphate is 11½ d. to 11¾ d. per unit with one-fifth rise on a guarantee of 80 per cent.

Ocean freights are ruling low this season. Sailing vessels from 2s. to 3s. 6d., and for steamers from 3s. 6d. to 6s.

Captain Williams has been appointed Superintendent of the North Star Mines, vice Mr. W. H. Smith resigned. Present output is expected to assay 88 per cent.

A well authenticated rumour is current that a large and valuable bed of phosphate has been discovered on the lands of Troy Lake Mining Company. An investigation with a view to determine the extent and value of the discovery is being made.

At Little Rapid's Mines the usual output of high grade ore continues. The tramway from the mines to the river has been completed and thoroughly equipped. The ore will now be hauled from the mines to the river edge at a minimum cost. Shaft B has reached a depth of over 200 feet, and shews a vein of pure apatite full width of shaft. Mr. Pickford, sr., of London, England, accompanied by Mr. Green, of Montreal, and other phosphate experts, lately paid a visit to this valuable property and were greatly pleased with the general appearance of the property and its management.

The Otty Lake Mines are now in good working shape; a third pit has been commenced upon this month and yields a large quantity of high grade ore. The present output is 15 to 20 tons daily with about 50 men employed.

Messrs. Butler, Breed & Co., Boston, propose distributing the following circular very widely among the farmers of New England. It is of much interest as shewing a movement in a direction of vast importance to our Canadian Phosphate Industry:—

GROUND PHOSPHATE.

"It is very generally admitted that if it were not for the high prices charged for commercial fertilizers, and the doubt often existing in the minds of purchasers as to their quality, and the trustworthiness of the analysis, the use of artificial means for supplying worn out land with the much needed elements for plant food, would be very much more general, and the quantity that would be used by farmers largely increased.

"The undersigned have arranged to put on the market *Fine Ground Phosphate*—soluble in the water of

the soil—superior in quality to Ground Carolina Phosphate, because containing a greater percentage of phosphoric acid. In support of the growing practice of using raw phosphate, we quote the following from the Annual Report of the Conn. Agricultural Experiment Station for 1884—page 30:

"The raw phosphates, South Carolina and Navassa, and the phosphate guanos, have been used by some of our farmers instead of super-phosphates with satisfactory results. While on one hand, the acid phosphates are more quickly available, on the other hand, much more phosphoric acid can be applied to land for the same money, in the form of raw phosphate, which latter advantage may make the raw material in some cases the more economical, as in seeding down to grass, or preparing land for fruit trees, &c."

We also quote from a letter from A. H. Ward, Esq., Agricultural Editor of the Boston Post, as follows:—

"To render raw phosphates as quickly available as the acid phosphates, all that is required is to compost it with fermenting manure, which can be done as the manure is made during the winter. Soluble phosphoric acid, whether made from bones or the mineral phosphates, is all of equal value as plant food."

"The degree of pulverization controls, almost without exception under similar conditions, the rate of solubility, and the more or less rapid diffusion throughout the soil."

"Soluble phosphoric acid, when applied to the soil, reverts to its original condition in a short time. But it is better to use the Fine Ground Phosphate and render it soluble by the aid of fermenting manure, in preference to using acids, which more than double the cost without increasing its ultimate value as a fertilizer."

"When the raw phosphate is to be used without mixing with manure, it should be put on the land about six months earlier than super-phosphates, and after the lapse of that time, a large percentage will have become soluble, and the balance will be assimilated as fast as the water of the soil can act on it."

Mr. Milne, representing Messrs. W. & H. M. Goulding (Limited), of Dublin, the largest manufacturers of phosphates in Ireland, was recently in Montreal in connection with the purchase of high grade ore. He reports that the prospects on the other side are very favourable.

Writing anent recent cablegrams to the effect that all the phosphate deposits of South Carolina had been "cornered" by a syndicate of wealthy capitalists the *Canadian Trade Review* says:—

"The object of the men who control the Carolina phosphate fields is to put up the price of crude rock. They are reported to have secured absolute control of every ton of rock mined in the state, and propose to regulate prices at will. Last year the aggregate reduction of South Carolina phosphate rock was 449,603 tons, of which 381,603 tons were exported and 68,000 tons were consumed by the local fertilizer manufacturing companies. The aggregate value of this production was, in round numbers, \$2,000,000. The total quantity of phosphates shipped from Canada last year was 25,974 tons valued at \$431,951, but the Canadian phosphate lands are probably capable of yielding more mineral than those of the state referred to."

MINING NOTES.

Nova Scotia.

The Brookfield Mine is showing up well.

Recent tests made from quartz taken from the Parker and Douglas, Bartling gold mine, at Malaga, have given very satisfactory results. Two leads are being prospected, one being about 42 inches wide between the walls, and the other 10 inches. The yield from the widest lead at a depth of 50 feet was one ounce to the ton, and from the other two ounces and one half to the ton. The owners of this mine intend at once to put up a 20-stamp mill, which will be the largest in the county.

The *Critic* announces that a four foot gold bearing lead has been discovered on the Stemshoon property, Mooseland.

The Provincial Government has introduced a bill to prevent strikes and lockouts in mines. The principal section reads:—

"Whenever any dispute shall arise between the employer and employed of such mines in regard to wages, mode of working, or any other matter, the employer shall not dismiss or lock-out the employed, nor shall the employed strike or abandon work, without first laying complaint in writing before the commissioner."

The bill provides that when the employed, or a majority of the employed, shall make a complaint in writing to the Commissioner of Works and Mines, he shall, in his discretion, submit the whole matter to a Board of Arbitrators. This award is to have the same force and effect as a judgment of the Supreme Court and shall operate as an attachment on the whole mining property, after payment of royalties, if the award should be against the employers; and shall bind a certain amount, equal to 14 days wages, which the Act provides shall be reserved and kept from the employees, to meet any such contingencies, in the event of judgment going against the employees.

"The object of the Act" says the *Gazette* "is a good one, but such a law we fear would prove inoperative."

"We doubt if either man or master would willingly accept it. The arbitration clause alone might be productive of good, as tending to bring the opposing forces together before a tribunal which both could respect, and in the integrity of which each could place confidence. But neither would care, we think, to become liable to such a penalty as is provided for a refusal to acquiesce in the court's decision, for there are instances when each party to a labour contest is thoroughly convinced that he is right and that to retire from his position would be to accept ruin. In such a case a confiscation of the property of the conscientious recalcitrant would be an act of tyranny, that we doubt if any British court would sustain. And it is in the settlement of such cases that the great difficulty in the labour problem lies."

The official returns received for month of May are

District.	Mill.	Tons Crushed.	Oz. Gold.
Brookfield.....	Brookfield.....	155	189½
Fifteen-Mile Stream...	Egerton Gold Mining Company...	80	42½
Sherbrooke.....	Mineurs'.....	29	4½
do	Goldenville.....	47	11½
East Rawdon.....	Rawdon.....	280	171½
Dars' Hill, Salmon River.....	The Dufferin.....	286	222

Fifty men are at work at the Essex Gold Mines, at Tangier. The foundations of the new Wiswell Mills are nearing completion.

The *Critic*, of 17th inst., states that Mr. Tonquoy, of Moose River, brought to town last week a gold bar weighing 106 oz., the work of 10 men for a month. Of this, 14 oz. was mortared by hand from 50 lbs. of quartz, the balance being milled from 34 tons crushed.

Quebec.

Some good specimens of gold and silver ore have lately been brought in from the Portage du Fort district.

Operations at the Asbestos mines have been prosecuted vigorously, and show an average steady output. Prices remain firm.

All the other mines are in active operation, but we know of no special feature to report concerning these. New uses for Asbestos are being gradually found, and an increased and growing demand is found for the lower grades of crude stock, which supply a want for materials where cheapness is required.

The Anglo Canadian Company are continuing operations upon the lines indicated in our last, and both the quantity and quality of output show a steady improvement.

The vein of gold recently discovered in the neighbourhood Mattawa turns out to be even more valuable than at first reported, it having been found to extend for a great distance and to become much richer. The vein crosses beneath the Ottawa river and enters the mountains on the north side in Quebec province. An assay which has been made shows the quartz to be exceedingly rich in the precious metal. Dr. A. M. Earle's discovery was made in the mountain opposite Mattawa and assays made from his specimens give 2 oz., 12 dwt. 12 grs. per ton. Numerous parties are out prospecting and moneyed men in the district are reported to have made investments.

Some further information may be gleaned from the remarks of our correspondent who says "gold was first discovered in this vicinity about the middle of last month." The locality is in the Province of Quebec directly opposite Mattawa and in unsurveyed territory. A number of assays have been made by Mr. J. T. Donald, of Montreal, which give results varying from \$19.00 to \$35.00 per ton, gold. The precious metal is not visible in the quartz, but on being pulverized and subjected to chemical process it has readily been obtained.

Three companies have been organized and among others interested are Dr. Earle and Mr. Adam Burwash, Mattawa, and Messrs. McAllister and Metcalfe, of Pembroke.

Operations are being conducted with much activity at the mica mines of the Villeneuve M. & M. Compy., near Buckingham. A fine quantity of very superior clear white mica is being produced. Very large crystals, shewing a perfectly smooth surface without a speck or flaw, have been taken out within the past few days, and the management report that the twist of the vein has now been passed. Two steam drills are at work, and the company are kept very busy handling orders for home and foreign trade. The management state that the demand this summer promises to be much in excess of former years.

Ontario.

From a circular issued by the Kingston & Pembroke Mining Company we learn that they have 13 distinct mining properties, located along the Kingston & Pembroke Railroad, which are being worked more or less, and are known: 1st.—The Zanesville Glandower, owned in fee simple. Comprises 650 acres, from which 10,000 tons of ore have been sold. Has \$20,000 worth of machinery. There are three (3) openings on this vein, covering a distance of half a mile. A large amount of ore, estimated by a conservative engineer to be 40,000 tons, is in sight in the main shaft. 2nd.—The Grady-Machar Mine. Owned in fee simple, and comprises 100 acres, upon which there is \$2,000 worth of machinery. 3rd.—The Levant Mine. Comprising 450 acres, which is leased for 99 years at a royalty of 15 cents per ton. There are three (3) shafts on this property, from which some 60,000 of ore have already been taken. This property contains the Wilbur mine, which produces ore lower in phosphorus than any Bessemer ore imported into the United States. There is \$40,000 worth of machinery on this property. 4th.—The Lalonde Mine. 100 acres in fee, upon which there is \$2,000 worth of new and improved machinery. 5th.—

The Culhane Mine, 100 acres in fee and \$2,000 in machinery. 6th.—The Williams Mine, 100 acres in fee and \$5,000 worth of machinery. 7th.—The Calabogie Mine. This property is leased at a royalty of 15 cents per ton on ore sold; \$15,000 worth of machinery. 8th.—The "Blue" Ore Lot, 100 acres in fee. 9th.—The Mississippi Mine covers one square mile, and is leased for 99 years at a royalty of 15 cents per ton on ore mined and sold. There has been 150,000 tons taken from this mine thus far. The plant cost \$20,000. 10th.—The Gilder-sleeve Mines comprise 1,266 acres in fee and 300 acres in rights. This property contains the celebrated "Flower" mine, which is considered to be the largest mine ever found in Canada. 11th.—The company owns options on some 2,600 acres of mining lands in the townships of Palmerston, Sherbrook, Bahurst, Oso and Alden, costing already some \$10,000, and which can be taken up at a cost of some \$26,000 for the lot, or \$1,000 for 100 acres. 12th.—The "Red Ore" Lot, 100 acres in fee. 13th.—The Black Lake Lot, 100 acres in fee. The manager writes that he has just received the first report of the two cargoes of ore sent to the Joliet Steel Company. He says: "The iron is fully up to our guarantee, and the phosphorus is lower than any ore ever sent to Chicago, '005."

Owing to the increased iron duties Messrs. Cleveland, Brown & Co., one of the largest firms in the Western States, propose opening a branch at London which will give employment to 200 men. Exemption from taxation for ten years is asked.

The *Aylmer Times* states that the copper property owned by Mr. Conroy, near Mattawa, has been sold to an American firm for \$20,000.

PORT ARTHUR DISTRICT.

The main shaft at the Rabbit Mountain Mine has reached a depth of 267 feet. The quantity of silver ore in sight is very encouraging. Considerable improvements have been made. A new compressor house 22x90 two storeys in height, has been erected. In this building are situated the carpenter and blacksmith shops and boiler house. The new compressor machinery and hoist will be brought in as soon as the road leading to the mine is made passable for heavy loads. The capacity of the hoisting apparatus is 250 tons every 24 hours. A new pump has been put in the 250 foot level, which has a capacity of 102 gallons a minute. Other improvements are contemplated.

Some idea of the value and progress made by the various mines in the district may be gathered from the following from the pen of Prof. C. F. Eschweiler in the *Evening Wisconsin*:

"The worst time for the silver district of Port Arthur has passed. The Beaver, Rabbit Mountain and Silver Mountain will dispel all doubt about the paying capacity of these mines. People have forgotten that Silver Islet paid \$600,000 in dividends, besides paying for the mine and the very expensive coffer dam around the shaft. Under ordinary circumstances that mine could have paid about \$2,000,000 in dividends, having 3,500,000 product. The Beaver has all the advantages a mine requires. It has wood and water close at hand, it is kept out of the stock market, and can ship its products at very low rates. Mine and mill are but 2,000 feet apart. The shaft of the Rabbit mine is 260 feet deep, and the vein is getting richer, showing that the silver is not confined to the junction of trap and slate. The Silver Mountain mine seems to promise well. The slate belts of Silver Mountain are underlying those of the slate in which the Rabbit Mountain and the Beaver are finding their silver, because the whole slate formation dips with an angle of about ten degrees towards the coast. Therefore, it is safe to draw the

conclusion that the veins will hold out in depth, if only the proper deposits are worked."

Work at the Beaver mine is being conducted with much vigor. No. 2 shaft has reached a depth of 185 feet, and the quality of the ore is pronounced to be very good.

Manitoba and North-West Territories.

A meeting of the directors of the Canadian Anthracite Coal Company was held during the month at Ottawa. Shipments from the mines are to begin forthwith.

British Columbia.

Latest despatches report that the fund for the relief of the sufferers by the recent calamity at Nanaimo now amounts to \$11,497.75. It is expected that the amount will reach \$25,000.

With a view to securing benefit under the new Act to encourage quartz mining, the B. C. M. & M. Co. have presented to the Government a report on their properties. It is said to be in the highest sense favourable.

New and important discoveries of gold and silver bearing quartz are reported in the Nicola Valley. Prospecting is being pursued with vigor in the district.

The annual meeting of the Vancouver Coal Mining and Land Company (Limited) was held at London on 3rd inst. In moving the adoption of the report the Chairman stated that during the past six months there had been a gross profit of £8,289.10s. £3,554 had been applied to repairs and depreciation, £921 to reserve fund, £1,546 to debenture interest and £744 to London charges, totalling up to £6,709,000 and leaving a net profit of £1,522. The net profit for the previous half year was £2,934. The report was adopted. Messrs. Needham and Trendor were re-elected directors and Messrs. Hill and Lovelock auditors to the corporation.

The *Colonist* announces that rich quartz has been discovered at the forks of Rock Creek in the direction of what is known as Bald Mountain. The surface rock is stated to be very rich, containing free gold. The ledges are wide and the appearance of the country indicates a large quartz belt. The attitude at which the quartz is found is about 3,500 or 5,000 feet above sea level. The quartz is evidently a feeder of Rock Creek, in which stream desultory mining has been carried on for years, and where at one time there was a great placer excitement. Several locations have been made.

We learn that travellers returning from the northern end of Vancouver Island have brought to Victoria rich samples of gold and silver quartz taken from that district.

It is understood that the Island Mountain Quartz Mining and Milling Company have complied with all the requirements of the Act granting bonuses and guarantees to quartz mills, and are now qualified to draw on the Government for the \$20,000 applied for under the Act. The old Kuitz & Lane engines and boilers and the Enterprise Company's stamp mill are in the possession of the company, and will be at once moved to the mill site prepared for them last fall at Jack of Clubs lake, while chlorination for smelting works, whichever is best adapted for treating the ore, will be erected during the summer months. Considerable work has already been done on the ledge by running in tunnels, &c., and it is understood that the

engineer's report to the Government states that there is 10,000 tons of ore in sight. The ledge is of considerable width, and at whatever point it has been struck, assays and mill tests made have resulted highly favourable.

Great Britain.

The peril which in spite of all the preventative efforts of science and legislation ever attends the avocation of the coal miner has received a fresh and terrible illustration by the recent explosion at the Udston Colliery, about two miles from Hamilton in the West of Scotland. This colliery was opened about ten or eleven years ago. The district has an evil reputation in respect of the "fiery" nature of the principal seam worked in it—the well known "splint," and barely ten years have elapsed since the memorable disaster at the Blantyre pits when more than two hundred persons perished. The workings, it would appear, have been carried on in three seams of coal, the "ell," the main and the "splint," the latter at the great depth of nearly 900 feet below the surface. Partly, no doubt, on account of its position the seam gives off a large quantity of gas; but it does not appear that any large accumulation of this dangerous element has ever been observed in the pit, and it is stated that the working regulations have always been stringent and strictly enforced while the arrangements for ventilation and for communication with the surface are in accord with the most modern principles of coal working. The pit is ventilated by a fanner of about 20 feet in diameter, and as the explosion was not so violent as to wreck the apparatus, the volumes of pure air which it drew into the workings neutralised to a large extent the deleterious effects of the gas. Every precaution was taken against explosion. Before the men went down in the morning an inspection of the workings was made in case of "fire," and this had been done as usual. Throughout the mines Scotch gauze safety lamps were used, and no open lights were allowed. Of 74 men and boys in the mine at the time of the accident only two were brought out alive. A thorough investigation is being made as to the cause of the accident, but it seems doubtful whether the most rigid enquiry will be able to throw light on the subject for the lips of those who could have explained it have been closed for ever.

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ST. PAUL, MINN. WINNIPEG, MAN.
O. H. INGRAM, Treasurer,
EAU CLAIRE, WIS.

Mines at Anthracite, N. W. T., CANADA. v-1-19

Dominion and Industrial Exhibition.

In the prize list, which has just been issued, for the Dominion Exhibition to be held in conjunction with the Annual Exhibition of the Industrial Exhibition Association, at Toronto, from the 5th to 17th September next, the following prizes will be awarded exhibitors in class 85:—

ECONOMIC MINERALS AND ORES OF CANADA.

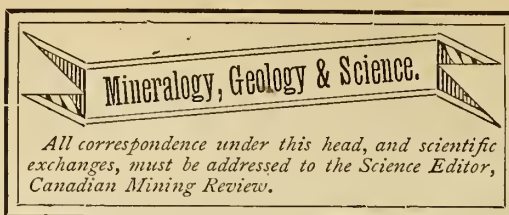
SEC.

1. Salt, crude. Bronze Medal
2. Salt, dairy (judges to test for impurities) Silver Medal

- | | |
|---|---|
| 3. Salt, table (judges to test for impurities)..... | Silver Medal |
| 4. Ochres and other mineral paints, best collection of..... | Diploma |
| 5. Gypsum, best collection, crude and calcined..... | Bronze Medal |
| 6. Marbles and Lithographic Stones best collection of..... | Silver Medal |
| 7. Phosphate of Lime, and its manufactures, not less than 50 lbs., each, well displayed..... | Silver Medal |
| 8. Clays and Sands for pottery, moulding and glass-making, collection of..... | Bronze Medal |
| 9. Cements, best assortment of, for building purposes, exhibitors to be present with the judges to have tests made..... | Silver Medal |
| 10. Asbestos and its manufactures, if exhibit is worthy..... | \$10 |
| 11. Mica, in mass and sheets, labelled with locality where found..... | 10
1st 2nd |
| 12. Iron Ores, large specimens, Diploma and..... | \$10 \$5 |
| 13. Copper Ores, large specimens, Diploma and..... | 10 5 |
| 14. Gold and Silver Ores, Diploma and..... | 10 5 |
| 15. Lead Ores, large specimens, Diploma and..... | 5 3 |
| 16. Plumbago and its manufactures, large specimens, Diploma and..... | 10 5 |
| 17. Best collection of Mineral and Geological specimens, properly classified and described, of which one-fourth at least have not been previously exhibited here..... | 10 5 |
| 18. Best collection of Mineral and Geological specimens, as in Sec. 17, by students under 18 years of age..... | 8 5 |
| 19. Best Archæological collection. { | 1. Dominion Gold Medal
2. Silver Medal |
| 20. Extra Entries. | |

The entrance fee is 25 cents. Any of our readers who may desire a copy of the complete Prize List can obtain one by communicating with Mr. H. J. Hill, the secretary, Toronto.

At a recent meeting of the Berlin Physical Society, Dr. Gross explained his theoretical view on the heat of solution of magnetised iron, and showed why, in accordance with these, the heat of solution of magnetised iron must be greater than that of unmagnetised. One result of these views was that a piece of magnetised and unmagnetised iron in a conducting fluid capable of dissolving the iron must give a current; this he has already demonstrated two years ago. The current in such an element as this flows across the fluid from the magnetised to the unmagnetised pole, and is independent of the nature of the magnetisation. The source of the electric current is in this case, according to the views of the speaker, to be sought for in the loss of specific magnetisation which the molecules of iron undergo as they pass, from the solid to the fluid condition. Of the various solutions of salts of iron which were used in these experiments, only neutral salts of ferrous oxide were found to yield a result, while the salts of ferrous oxide gave no current. The cause of this is, according to the speaker, that only the ferric salts lead to a solution of the magnets. Nature says: "Dr. Nichols has quite recently carried on some experiments on the heat of solution of magnetised iron, and has obtained the same experimental results—namely, that the heat of solution of magnetised iron is greater than that of unmagnetised, although he starts with theoretical views respecting the magnetic potential of solid iron and iron in solution which are diametrically opposed to those of Dr. Gross."



Ottawa Field Naturalist Club.

Notes on the Utica and Trenton Formations at New Edinburgh.

By. H. M. Ami, M.A., F.G.S.

Ever since the opening of the collecting season this year there have been ample opportunities afforded the members of the Ottawa Field Naturalist Club and others interested in the science of geology to examine a number of interesting exposures about Ottawa, and not a few have availed themselves of this opportunity. Foremost among the numerous sections observed in the series of Cambro-Silurian rocks are those which may still be visited in New Edinburgh, along Creighton street. Since the addition of the vice-regal suburb to the city, Engineer Surtees has been busily engaged carrying on excavations for waterworks purposes in this new ward, and as New Edinburgh is for the most part built immediately upon the Trenton and Utica formations, which are overlaid by exceedingly thin and for a considerable extent by our Post-Tertiary deposits, such as drift clay, sand and the like—there is a considerable amount of blasting to be done.

The highly fossiliferous measures of the Utica, resting immediately and conformably upon these of the Trenton, may be well seen on Creighton street. The contact of the two formations occurs near the northern end of this street, and the Trenton strata occurring then at the northern extremity of the street, show clearly the transitional character of this series of strata.

The Trenton here consists chiefly in dark grey or black bituminous limestones, for the most part nodular and holding such characteristic form, viz:—*Murchisonia*, *bellicincta*, *Hall*, *Trochonomia*, *mubilitatum*, *Hall*, *leptaena*, *Sericea testudinaria*, and the *Strophomena Alternata*.

Before crossing Union street, nearly 100 yards from that street, the Utica is well seen and such well-known and characteristic forms as *Asaphus Canadensis* indicate the horizon of the rocks. No less than thirty species of fossils have already been obtained from the measures of the Utica in New Edinburgh, and no doubt more will be found when careful collecting has been made and when the material obtained shall have been examined.

A special interest attaches itself to the rock which confines the measure of this formation. They are for the most part highly bituminous, and when distilled can be made to yield a highly inflammable substance which belongs to the *petroleum* group. The shales of Windsor, Ont., a village near Collingwood, have yielded bitumen, and *coal oil* was obtained from those shales. The percentage of this useful material in the shales, however, is not such as would warrant their being distilled for oil. The operations at Windsor being leased where the abundant supplies from the Devonian shales of the Essex peninsula in Western Ontario and elsewhere was discovered. The bituminous character of the rocks of the Utica formation is no doubt due to the presence in vast numbers of the remains of trilobites, and such forms of by-gone life.

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"	19	14	23	640 "

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Mining Regulations

TO GOVERN THE DISPOSAL OF

Mineral Lands other than Coal Lands,

1886.

THESE REGULATIONS shall be applicable to all Dominion Lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, iron or other mineral deposits of economic value, with the exception of coal.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein, either by surface or subterranean prospecting for mineral deposits, with a view to obtaining under the Regulations a mining location for the same, but no mining location or mining claim shall be granted until the discovery of the vein, lode or deposit of mineral or metal within the limits of the location or claim.

QUARTZ MINING.

A location for mining, except for iron on veins, lodes or ledges of quartz or other rock in place, shall not exceed forty acres in area. Its length shall not be more than three times its breadth, and its surface boundary shall be four straight lines, the opposite sides of which shall be parallel, except where prior locations would prevent, in which case it may be of such a shape as may be approved of by the Superintendent of Mining.

Any person having discovered a mineral deposit may obtain a mining location therefor, in the manner set forth in the Regulations which provides for the character of the survey and the marks necessary to designate the location on the ground.

When the location has been marked conformably to the requirements of the Regulations, the claimant shall within sixty days thereafter, file with the local agent in the Dominion Land Office for the district in which the location is situated, a declaration or oath setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as aforesaid; and shall, along with such declaration, pay to the said agent an entry fee of FIVE DOLLARS. The agent's receipt for such fee will be the claimant's authority to enter into possession of the location applied for.

At any time before the expiration of FIVE years from the date of his obtaining the agent's receipt it shall be open to the claimant to purchase the location on filing with the local agent proof that he has expended not less than FIVE HUNDRED DOLLARS in actual mining operations on the same; but the claimant is required, before the expiration of each of the five years, to prove that he has performed not less than ONE HUNDRED DOLLARS' worth of labor during the year in the actual development of his claim, and at the same time obtain a renewal of his location receipt, for which he is required to pay a fee of FIVE DOLLARS.

The price to be paid for a mining location shall be at the rate of FIVE DOLLARS PER ACRE, cash, and the sum of FIFTY DOLLARS extra for the survey of the same.

No more than one mining location shall be granted to any individual claimant upon the same lode or vein.

IRON.

The Minister of the Interior may grant a location for the mining of iron, not exceeding 160 acres in area which shall be bounded by north and south and east and west lines astronomically, and its breadth shall equal its length. Provided that should any person making an application purporting to be for the purpose of

mining iron thus obtain, whether in good faith or fraudulently, possession of a valuable mineral deposit other than iron, his right in such deposit shall be restricted to the area prescribed by the Regulations for other minerals, and the rest of the location shall revert to the Crown for such disposition as the Minister may direct.

The regulations also provide for the manner in which land may be acquired for milling purposes, reduction works or other works incidental to mining operations.

Locations taken up prior to this date may, until the 1st of August, 1886, be re-marked and re-entered in conformity with the Regulations without payment of new fees in cases where no existing interests would thereby be prejudicially affected.

PLACER MINING.

The Regulations laid down in respect to quartz mining shall be applicable to placer mining as far as they relate to entries, entry fees, assignments, marking of localities, agents' receipts, and generally where they can be applied.

The nature and size of placer mining claims are provided for in the Regulations, including bar, dry, bench, creek or hill diggings, and the RIGHTS AND DUTIES OF MINERS are fully set forth.

The Regulations apply also to

BED-ROCK FLUMES, DRAINAGE OF MINES AND DITCHES.

The GENERAL PROVISIONS of the Regulations include the interpretation of expressions used therein; how disputes shall be heard and adjudicated upon; under what circumstances miners shall be entitled to absent themselves from their locations or diggings, etc., etc.

THE SCHEDULE OF MINING REGULATIONS

Contains the forms to be observed in the drawing up of all documents such as:— "Application and affidavit of discoverer of quartz mine." "Receipt for fee paid by applicant for mining location." "Receipt for fee on extension of time for purchase of a mining location." "Patent of a mining location." "Certificate of the assignment of a mining location." "Application for grant for placer mining and affidavit of applicant." "Grant for placer mining." "Certificate of the assignment of a placer mining claim." "Grant to a bed rock flume company." "Grant for drainage." "Grant of right to divert water and construct ditches."

Since the publication, in 1884, of the Mining Regulations to govern the disposal of Dominion Mineral Lands the same have been carefully and thoroughly revised with a view to ensure ample protection to the public interests, and at the same time to encourage the prospector and miner in order that the mineral resources may be made valuable by development.

COPIES OF THE REGULATIONS MAY BE OBTAINED UPON APPLICATION TO THE DEPARTMENT OF THE INTERIOR

A. M. BURGESS,

Deputy Minister of the Interior.

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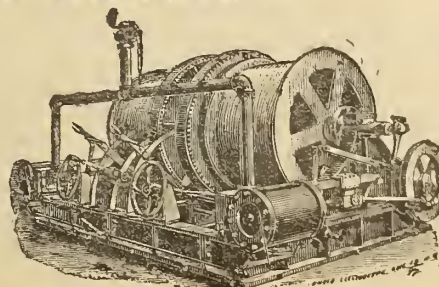
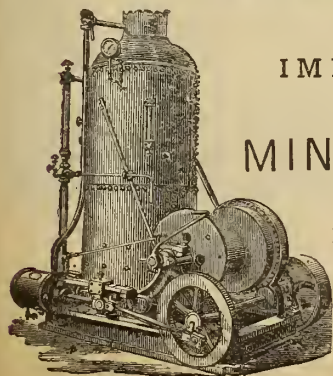
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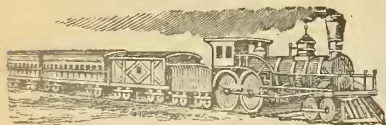
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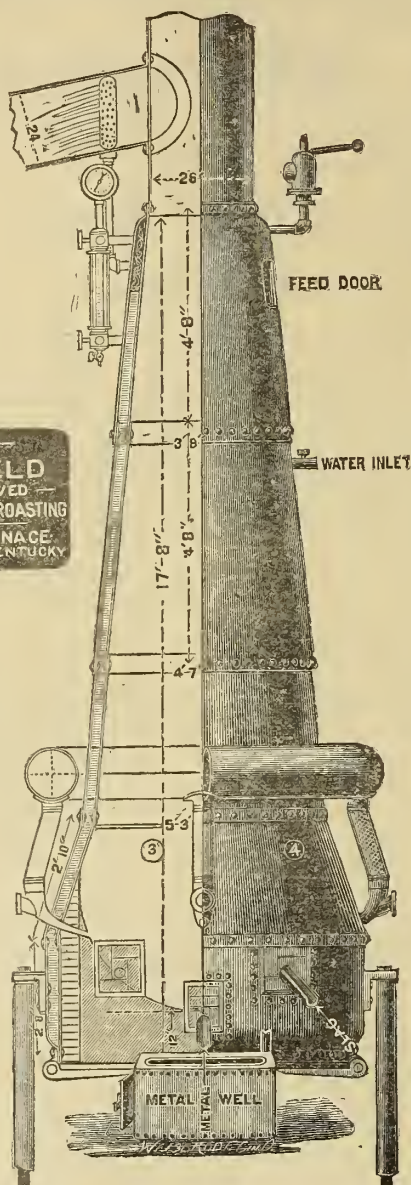
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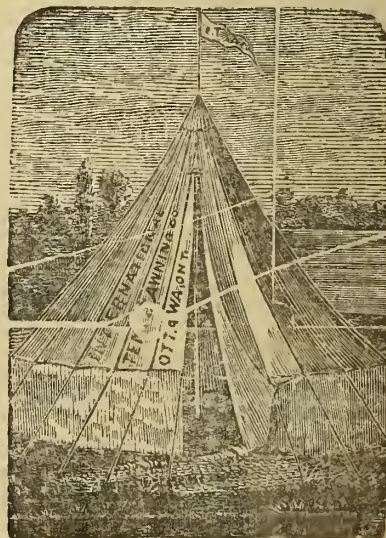
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Vol. V.—No. 5.

1887.—OTTAWA, JULY—1887.

Vol. V.—No. 5

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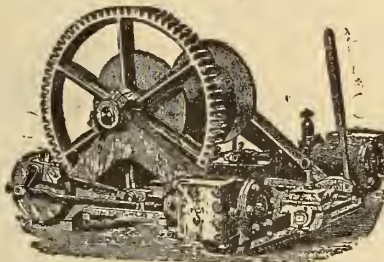
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Notice to Contractors.

SEALED TENDERS addressed to the undersigned, and endorsed "Tender for Superintendent's Residence at Experimental Farm, near Ottawa, Ont.," will be received until FRIDAY, 24th June next, for the several works required in the erection and completion of the

SUPERINTENDENT'S RESIDENCE AT EXPERIMENTAL FARM, NEAR OTTAWA, ONT.,

Plans and specifications can be seen at the Department of Public Works, Ottawa, on and after Friday, the 10th June next.

Intending contractors should personally visit the site and make themselves fully cognizant of the work to be done, according to the said plans and specifications, before putting in their tenders.

Persons tendering are further notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque made payable to the order of the Honourable the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party decline to enter into a contract when called upon to do so, or if he fail to complete the work contracted for. If the tender be not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

By order, A. GOBEL, Secretary.

Department of Public Works,
Ottawa, June 2nd, 1887.



MAIL CONTRACT.

SEALED TENDERS addressed to the Postmaster General will be received at Ottawa until noon on FRIDAY, 5th August, 1887, for the conveyance of Her Majesty's Mails, on a proposed Contract for four years, six times per week each way, between

METCALFE
AND
OTTAWA,

from the 1st September next.

Printed notices containing further information as to conditions of proposed contract may be seen and blank forms of Tender may be obtained at the Post Offices of Greely, Leitrim, Billings, Bridge, South Gloucester, Ottawa, and at this office,

T. P. FRENCH,
Post Office Inspector.

Post Office Inspector's Office,
Ottawa, June 2nd, 1887.

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Sec.—Strait of Canso to Grand Narrows.

TENDER FOR THE WORKS OF CONSTRUCTION.

SEALED TENDERS, addressed to the undersigned and endorsed "Tender for Cape Breton Railway," will be received at this office up to noon on Wednesday, the 6th day of July, 1887, for certain works of construction.

Plans and profiles will be open for inspection at the Office of the Chief Engineer and General Manager of Government Railways at Ottawa, and also at the Office of the Cape Breton Railway, at Port Hawkesbury, C.B., on and after the 6th day of June, 1887, when the general specification and form of tender may be obtained upon application.

No tender will be entertained unless on one of the printed forms and all the conditions are complied with.

By order, A. P. BRADLEY, Secretary.

Department of Railways and Canals,
Ottawa, 27th May, 1887.



Department of Inland Revenue.

An Act respecting Agricultural Fertilizers.

The public is hereby notified that the provisions of the Act respecting AGRICULTURAL FERTILIZERS came into force on the 1st of January, 1886 and that all Fertilizers sold thereafter require to be sold subject to the conditions and restrictions therein contained—the main features of which are as follows:

The expression "fertilizer" means and includes all fertilizers which are sold at more than TEN DOLLARS per ton, and which contains ammonia, or its equivalent of nitrogen, or phosphoric acid.

Every manufacturer or importer of fertilizers for sale, shall, in the course of the month of January in each year, and before offering the same fertilizer for sale, transmit to the Minister of Inland Revenue, carriage paid, a sealed glass jar, containing at least two pounds of the fertilizer manufactured or imported by him, with the certificate of analysis of the same, together with an affidavit setting forth that each jar contains a fair average sample of the fertilizer manufactured or imported by him; and such sample shall be preserved by the Minister of Inland Revenue for the purpose of comparison with any sample of fertilizer which is obtained in the course of the twelve months then next ensuing from such manufacturer or importer, and which is transmitted to the chief analyst for analysis.

If the fertilizer is put up in packages, every such package intended for sale or distribution within Canada shall have the manufacturer's certificate of analysis placed upon or securely attached to each package by the manufacturer; if the fertilizer is in bags, it shall be distinctly stamped or printed upon each bag; if it is in barrels, it shall be either branded, stamped or printed upon the head of each barrel or distinctly printed upon good paper and securely pasted upon the head of each barrel, or upon a tag securely attached to the head of each barrel; if it is in bulk, the manufacturer's certificate shall be produced and a copy given to each purchaser.

No fertilizer shall be sold or offered or exposed for sale unless a certificate of

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CERTAIN lots and the timber thereon situate in the Townships of Allan, Assiginack, Bidwell, Billings, Carnarvon, Campbell, Howland, Sheguandah, Tehkummah and Mills on the Manitoulin Island, in the District of Algoma, in the Province of Ontario, will be offered for Sale by Public Auction in blocks of 200 acres, more or less, on the first day of September next, at 10 o'clock A.M., at the Indian Land Office in the Village of Manitowaning.

Terms of Sale.—Bonus for timber payable in cash, price of land payable in cash, a license fee also payable in cash and dues to be paid according to Tariff upon the timber when cut.

The land on which the timber grows to be sold with the timber without conditions of settlement.

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L. VANKOUGHNET,
Deputy of the Supt. Gen'l.
of Indian Affairs.

Department of Indian Affairs,
Ottawa, 2nd June, 1887.



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PERSONS requiring passports from the Canadian Government should make application to this Department for the same, such application to be accompanied by the sum of four dollars, in payment of the official fee upon passports as fixed by the Governor-in-Council.

G. POWELL,
Under Secretary of State.
OTTAWA, 19th Feb., 1886.

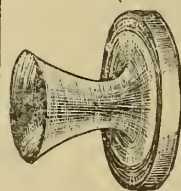
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The CANADIAN MINING REVIEW, is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts, as well as others interested in Canadian Mineral Lands, are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 17th of the month.

Address all correspondence, &c., to the Publishers of the CANADIAN MINING REVIEW, Ottawa.

Advertising Space.

The circulation of the CANADIAN MINING REVIEW, which has steadily been going up since its first publication, more than five years ago, has now more than doubled the estimate upon which we had reckoned, and its value as an advertising medium to business men who wish to reach the best classes of mine owners and operators, and the mining centres and camps of every province in the Dominion, is consequently very greatly enhanced. The REVIEW is in the widest sense a Canadian journal belonging to all provinces alike; it is the only journal published in Canada wholly devoted to the interests of her mining industries and mineral resources. We would simply draw the attention of those who have hitherto overlooked it, to this matter, promising our best attention and most reasonable terms on any application for advertising space.

Mining Engineers and their Responsibilities.

The grave want of common carefulness, worse still, the gross carelessness and in some instances even unscrupulous lying that is sometimes to be found in publications and reports circulated in connection with contemplated mining enterprises has been strongly deprecated in these columns. It is not the practice of vendors of mining properties to under-estimate the value of their possessions when seeking to attract the pockets of capitalists; and this is all the more reason why extra care and precaution should be taken by our mining engineers of repute, to whom is entrusted the examination of and reporting on mining properties, or the responsible task of verifying or otherwise the generally exaggerated statements made by or on behalf of the vendors.

This is very well pointed out in a recent issue of an English contemporary, which says:—

"Events which have occurred in connection with recent attempts to float rather pretentious mining undertakings afford the most complete evidence that if this legitimate class of industrial enterprise is to retain its favour with British capitalists some more reliable system must be adopted to ensure greater correctness in the reports published in prospectuses which set forth the value of a property and its probable return. The experts, so called, who are employed to place an approximate value upon mining property have, undoubtedly, a difficult task to perform, and we, who are acquainted with gentlemen of vast mining acquirements and experience in all parts of the world, are aware how earnestly many labour to discharge their duties in the face of many difficulties, and often of many temptations. It is true that many a man, however exact and conscientious he may be, may fall into error, and in such a case every allowance must be made; and generally is made, for any consequences which may result from lack of discretion. But recently a practice has crept in in connection with the examination of and reporting on mines, which is in every way reprehensible, not to use a stronger word. Recent events have shewn that almost culpable negligence or carelessness of the grossest kind has been displayed by mining engineers in connection with mining properties on which they have furnished reports. Examinations of the properties, if they have been made at all, seem to have been made in the most superficial and perfunctory manner. In all cases an investor, to whatever kind of undertaking he inclines, must largely rely on the judgment of others regarding the value and probable prospects of any particular property; but if this be so in regard to almost every kind of industrial undertaking, still more is it so in regard to a mining enterprise, because not only are the properties, as a rule, situated a long way off, but the whole details of management are of so intricate and technical a nature that entire reliance must be placed on those who are, or who profess to be, experts in these matters. Those who are interested in mining and who believe as we do, that it is a legitimate and often enormously profitable means of employing money, should insist that any laxity in connection with the all-important point of thorough initial investigation of mining properties, will be held to entail grave responsibilities on the part of those who profess to speak authoritatively, on that which they barely know little or nothing."

The history of several Canadian mining enterprises points out in no unmistakable manner how lamentable has been the loss of capital for lack of that careful preliminary inspection and investigation which should be made into the capabilities of every mining property before the public are invited to invest their capital.

A Commendable Enterprise.

Mr. Kamper, who was recently in Ottawa negotiating for the purchase of the Inter-Colonial Railway to a German Syndicate, states that a part of the contemplated scheme is to open up and operate immense iron works at or near Pictou. He says:—

"Our company has already spent some money in having an examination and report made of the iron resources in Nova Scotia by a staff of German engineers, and their report was so flattering that the company decided to open up immense iron and smelting works near Pictou, provided the Canadian Government would give us protection for a certain number of years to enable us to cope with American and European iron manufacturers. If this protection can be obtained we will at once commence the construction of immense works near Pictou, and will immediately bring out from Germany 1,000 skilled iron workers to introduce the German methods of working iron in Canada. We have also a very high opinion of the great mineral resources of Nova Scotia, and are satisfied that if worked according to German methods, and with sufficient capital, they would turn out results that would astonish Canadians."

The Government will no doubt see to it that these experienced Germans get every encouragement within reasonable limits. Their enterprise, if carried through to a successful issue, cannot fail to build up, on a modern and

practical basis, our iron industry in the Maritime Province.

We note that the Hon. Mr. Mowat has gone to England. While there the Ontario premier might make a careful study of British mining laws to the advantage of his Commissioner of Lands and Forests. A reservation of Ontario's mineral resources for the benefit of the mining community is badly wanted at present. Unfortunately as matters exist too much provision is made for speculators, farmers, cattle dealers and other slaughterers of the mining industry.

The following official figures are given to indicate the quantity of Anthracite and Bituminous coal shipped to Canada from the United States during the past fiscal year:—

ANTHRACITE.	Net Tons.
Ontario.....	666,785
Quebec.....	274,232
Nova Scotia.....	23,248
New Brunswick.....	49,443
Manitoba.....	4,540
British Columbia.....	63
Prince Edward Island.....	1,587
Total.....	1,019,898
BITUMINOUS.	
Ontario.....	829,174
Quebec.....	94,809
Nova Scotia.....	1,486
New Brunswick.....	4,813
Total.....	930,282
Coke (nearly all to Ontario).....	10,416
Coke dust.....	36,229

The Sudbury Copper Mines.

In an interview with Dr. R. Bell, Assistant Director of the Geological Survey, we gathered the following interesting notes on the above mines. Dr. Bell said in substance: Any information which I can give refers principally to the condition of these mines in January last, when I paid them a short visit, for although I was again at Sudbury in the end of May, I did not then re-examine the works. A considerable village is springing up at Sudbury, which is favourably situated at the junction of the Algoma branch with the main line of the Canadian Pacific Railway. Two places are being worked—one called the Copper Cliff Mine, five miles south-south-west of the village, and the other, called Stobie Mine, four miles north of it. At the first of them the ore was found in the face of a cliff of diorite forty or fifty feet high, and the deposit had been worked from the base of the cliff to a depth of forty or fifty feet, giving a total of eighty or ninety feet at the time of my visit. The shaft or elongated pit showed a vein of solid copper pyrites ten feet or more in width. Splendid masses of yellow pyrites were being taken out. A large quantity of ore was piled up for spauling previous to shipment. A spur track from the Algoma branch has been built to the very mouth of the shaft, so that there is every facility for sending off the ore. Mr. L.H. Ashmun, the general superintendent of the mines, informed me that before winter set in they had shipped some sixty-seven car loads, or between 3,000 and 4,000 tons from this mine to the smelting works at Bergin Point, near New York. Some of it contained as much as 18 per cent. of copper. The percentage of any particular lot depended on the care and labour which had been bestowed on dressing it up by

spauling and capping. The solid pyrites showed different shades of yellow in streaks and patches, according to the proportions of copper and iron combined with the sulphur. I understand that the shaft is now about twice as deep as when I saw it. The works at the Copper Cliff are under the intelligent management of Captain Samuel Hosking.

The Stobie Mine, four miles north of the village, had only been prospected up to January, but since that time, mining has been actively carried on. A branch railway from the junction was then almost completed, and is now in operation. As the ground was covered with snow I could not make a very thorough examination of the deposit at this locality, but from the information given me it must be of great extent. I was told by the superintendent that by costeeing they had ascertained the existence of a mass of ore measuring on the surface 1600 feet from north to south, and 1200 feet from east to west. It is in the form of a wide round hill, covered like the surrounding region with naked, burnt trees, and in appearance it does not differ in any way from the other low hills around. In digging through the surface, however, in any part of this hill, the subsoil is found to consist of red ochre, resulting from the burning of the oxide of iron, left by the decomposing ore. Below this are crusts of iron oxide like bog ore, and under them is a layer of black half-decomposed pyrites, which gradually passes into the solid sulphides of copper and iron. The two sulphides are mixed in a mottled and spotted form in various proportions. At the time of my visit they were putting up the machinery for driving an adit under the hill from the low ground on the east side. Since that time I hear that considerable progress has been made in this work. A deposit of such great extent is, of course, capable of furnishing an immense supply of ore and I have lately been told that the proprietors have contracted to furnish over 30,000 tons within the next year.

In addition to the two places which are being worked, promising deposits of copper ore have been found at a number of localities in various directions in the neighborhood. The original discovery of copper which led to the finding of all the others was made in a cutting on the main line of the railway a short distance west of the junction, but this place has not been worked. Judging from present appearances Sudbury promises to become a great centre of copper mining. The accidental discovery of copper at this place serves to indicate what great mineral wealth remains to be found in some of the more promising, but yet unexplored regions of the Dominion.

Geologically the Sudbury copper deposits occur in the Huronian rocks, near the southeastern edge of the great belt which extends north-eastward from Lake Huron to Lake Abitibi and beyond. More than thirty years ago, copper and iron pyrites, rich in nickel, was found on the north shore of Lake Huron at what was called the Wallace Mine. This is in the same geological horizon as the Sudbury Mines. I have examined the mine and the ore has a considerable resemblance to that of Sudbury, which also contains considerable nickel. Copper has been found in several places between the Wallace Mine and Sudbury, and also in the continuation of the strike to the north—eastward—on Tanagama Lake, for example, and again on the Blanche River, further on in the same direction. A belt of Huronian rocks, connected with the one already referred to, runs eastward from near Lake Abitibi to the south end of Lake Mistassini and on the south side

of this belt near the latter lake, a notable deposit of copper pyrites was found by the late Mr. Richardson, of the Geological Survey, many years ago. It would be interesting to have this ore analysed to ascertain if it also contained nickel. If it does, it would always be an additional fact in identifying this horizon, and would go to show that we have an important copper-bearing belt of rocks extending all the way from Lake Huron to Lake Mistassini, a distance of some 500 miles or greater than that from Toronto to Quebec.

Copper may also be looked for in a corresponding position on the opposite, or north-western side of the great Huronian belt I have referred to, and in this connection I am reminded of an interesting fact, namely, that in 1875 I discovered a vein worth noting on account of its size and the quantity of copper pyrites which it contained, on the east branch of the Montreal River, which apparently corresponds in geological position with the Sudbury deposits, but on the opposite side of the trough. It is mentioned in my report to Government of that year.

I regard the whole region around the Montreal River as a very promising one for economic minerals, and I am about to explore it geologically this summer.

Our Mines and Minerals.

W. A. Carlyle, Montreal.

Continued from June issue.

Canada is becoming more noted for her extensive and valuable mines of minerals, popularly known, such as apatite or phosphate, graphite or plumbago, asbestos, gypsum, mica, slate, marble, oil and salt. Day by day the value and utility of minerals long neglected and passed by, become more evident and new industries are springing up to convert the unsuspecting, seemingly useless rock into a commodity of commercial importance. It is well known that there are large deposits of graphite as pure as those of Ceylon or Siberia, only their proper development awaits the change of events and the removal of old country prejudices. The great European manufacturers, at Falor, have become so familiar with the graphite of the east or of Russia, that they will not deign to look at ore from new localities. From the mines at Grenville and Buckingham are got pure blocks of graphite weighing from 700 to 4,000 lbs. each.

Among the mining industries of importance none have grown so rapidly or promise greater returns in the future than the mining of phosphates of lime or apatite, which is found in great abundance in the Laurentians of the Ottawa Valley, at Templeton, Buckingham, Wakeland and Portland. With the advent of more capital and better means of access, these mines are being opened up in a proper and systematic manner, working summer and winter, and last year 20,000 tons, worth \$550,000, were shipped from Montreal to England and Germany. This phosphate, declared by an agent of the U. S. Government in his official report as apparently inexhaustible in volume, and the finest known in the world as a phos-

phate fertilizer, sells readily at this port at \$18.20 a ton.

In Western Ontario, near Goderich, are the famous salt beds, famous for their great thickness and purity of the rock salt. These beds, aggregating 128 feet in thickness of pure salt, are found at a depth of 1,500 feet, and from them brine is pumped up and concentrated. Dr. Sterry Hunt has estimated that these deposits will yield 880,000 bushels of salt per acre of area. In 1873 the yield amounted to 4,520,000 barrels, while since then the increase has been very great.

Not very far from here, at Petrolia, are the great oil wells of petroleum, a most valuable economic mineral. The wells are bored to a small depth, 500 feet, and now number 2,700, and during the past four years they have produced 6,000,000 barrels of crude petroleum annually.

Throughout the broad lands of our Dominion are scattered very great coal fields, aggregating 97,000 square miles, and containing at a low estimate 100,000,000,000 tons of coal. The collieries of the Maritime Provinces have long been well known, and now the coal beds of the North-West are arousing the keenest interest, as the presence of extensive beds of good coal in these great woodless tracts is imperative for the very existence of the tide of people now settling these new provinces. There is no coal in Ontario or Quebec. On the Pacific coast inferior beds of hard coal are on the Queen Charlotte Islands, while on Vancouver Island are the most productive mines west of the Rockies. In 1885 the collieries at Wellington and Nanaimo produced 360,000 tons of excellent coal, which was shipped to San Francisco, Honolulu, or consumed in British Columbia. The character of the coal in the North-West varies greatly, changing from a poor, watery lignite to good hard coal. Just east of the mountains, in the district of Alberta, are the brightest indications, as through the valleys of the Bow and Belly rivers along the foot of the Rockies, extend great coal beds that will yield from 4,000,000 to 9,000,000 tons per square mile, one seam alone, the "coal bank," containing 330,000,000 tons. The coal is similar to that mined in the Western States for the Union Pacific railway, and is much superior to most of the lignites and brown coals which give rise to important industries in various parts of Europe. This area has crossed beyond the first range of mountains, and at Banff, now becoming familiar to tourists and invalids, the coal is found altered to beds of anthracite that will compare favorably with some of the best beds in Pennsylvania. These coal fields are very easy of access, and already some are being extensively mined to supply the demands of the C. P. R., and of the people. Great lignitic coal beds have been discovered along the valleys of the Saskatchewan and the Souris rivers, and in many other districts; and it would seem as if Dame Nature had carefully hoarded up great

stores of light and heat for the people who will yet inhabit the vast prairies and valleys of this great territory.

In New Brunswick there is an area of coal containing 150,000,000 tons, but Nova Scotia boasts of the best Canadian collieries. In this province are three distinct coal basins, Cape Breton, Pictou and Cumberland, where many of the seams have a notable thickness of 25 feet to 58 feet. The coal is well suited for heating and illuminating, as well as for iron smelting, and is now exported in large quantities. The Sydney mine in Cape Breton was begun in 1785 and has since been in constant operation, yielding in 1885 over 150,000 tons. The Springhill mine in 12 years has produced 1,700,000 tons, while in 1884 the Intercolonial mines produced 120,000 tons, the Acadia mines 115,000, the Albion mines 200,000, and the Vale colliery 74,000 tons of coal. During the past year of 1886 1,430,000 tons of coal have been shipped from Nova Scotia, which will give some idea of the extent of coal mining in this part of Canada.

In 1850, by the bursting of a dam in Albert County, New Brunswick, a vein of black jet-like mineral* was exposed. It was not coal, but as an enricher of coal-gas. This vein, the only known one in the world, brought nearly \$1,000,000 to the fortunate possessors.

Canada may be justly proud of her coal measures, as these great deposits must yet play an important part in the political economy of this nation, as it is such stores of wealth that strengthen a nation's power and influence the industries and fortunes of her people.

The wealth of copper hidden away in our mountains, especially along the shores of Lake Huron and Lake Superior and near Lake Nipissing is evidently great. This district has been most favourable for the accumulation of iron, silver, copper and gold, as in the valleys or troughs of the Laurentians are the rocks of the Huronian Formation, which have been fearfully twisted and distorted, while there have been great out-pourings of volcanic matter. These great earth movements have left many gaping fissures which have since been filled up with quartz and mineral ores out of the surrounding rocks by the heated waters percolating through them, and in the same vein may be found, all mixed together, arsenic, sulphur, iron, zinc, lead, copper, silver and gold.

Loose copper has been found in British Columbia, and the Coast Indians have used from time immemorial copper brought from the Alaska rivers, which they claim can be found in great abundance. Mining in the Lake Superior district has, for the most part, been suspended, though the most extensive Canadian Copper mines have been developed here. The West Canada Mining Company owned the three most valuable properties, the Bruce, Wellington and Huron Copper Bay mines, of which the Bruce mines were opened in 1846. The veins were large and rich, and most of the

ore was shipped to England, after having been dressed so as to yield 20 per cent. of pure copper. In 1875 the works were abandoned owing to the caving in of the richest part of the mine, and the great fall in the price of copper after yielding \$3,300,000 worth of metal. Last summer great reports were circulated about the unusual richness of the copper deposits at the Sudbury mines, which are situated near the Canadian Pacific Railway, north of the Bruce mines and west of Lake Nipissing. It is quite possible that beds of exceptional richness may occur there, still these mines, it is now believed, are not at all phenomenal in their extent and value, though the results of this winter's work, where a large number of men is being employed, will give more correct and reliable information. ✕

At present, a copper mine to be paying, must possess exceptional facilities and richness, as in the United States and Europe. such a vast amount of copper is being mined so cheaply as to make this industry with difficulty profitable. In the State of Wisconsin there are copper beds which yield masses of pure metal weighing 100 tons; and in 1882 two mines, the Hecla and Calumet, produced 16,000 tons of copper. In Australia are great veins of pure ore, 80 feet to like jet or asphaltum and proving very valuable 100 feet thick; and in Spain, Hungary and Germany are beds of enormous extent which can be mined very cheaply. With this great competition and the want of proper fuel, Canadian copper mining has been necessarily limited to the most favored areas. At Ascot, in Quebec, are very good mines. From the Crown mines 18,000 tons of ore are being annually shipped to the United States. The Albert mine, 600 feet deep, is producing 25,000 per year, while the Hartford shaft, now closed, can produce 1,000 monthly. The Harvey Hill mines, near Leeds, were worked for a long time but finally closed in 1879. Good deposits are known in New Brunswick, Newfoundland, and Nova Scotia. At Coxheath, Cape Breton, operations of an extensive and successful character are being energetically carried on. Careful trials have been made by an expert mining engineer, who has reported that considering the price of fuel, plus labor, smelting can be done at this mine more cheaply than at any mine in the United States, and probably cheaper than at the extensive works of America or Europe. Thus the prospects of prosperous and extensive copper mining and smelting in this part of Canada are now very encouraging. New companies with large capital are being formed to mine the deposits north of Lakes Huron and Superior, and with better and cheaper processes, introduced during late years, this district may again soon flourish with this reviving industry.

The most important gold regions of Canada are in British Columbia, Quebec and Nova Scotia, while the precious metal has been found in the region of the Lake of the Woods and

Lake Superior, in veins associated with ores of copper, lead and silver. In British Columbia gold is very generally distributed, but the richest fields follow a region of mountains and high plateaux, comprising the Purcell, Gold and Cariboo ranges. Gold is said to have been first discovered near the junction of the Fraser and Thompson rivers, and in 1858, ten years after the great California rush of '49, miners began to flock in, and the gullies and flats of the Fraser became animated with men eagerly searching for the yellow metal. The gold has been mostly obtained by washing the placer deposits, and in 1860 the Cariboo district, the richest of all the Columbian diggings, was first worked. In 1869 Ominica was developed, Kootanie in 1886, while in 1886 occurred the rush to the Big Bend of the Columbia river. The total yield of the gold from this province up to 1886 amounted to \$49,000,000 worth of bullion, of which Cariboo gave nearly \$20,000,000. When compared with Australia or California, these gold diggings have not proved so very rich, for in one province alone of Australia, Victoria, during the same period of time, \$1,000,000,000 worth of gold has been mined. At present the surface deposits appear to have become quite impoverished, except at Cariboo and Granite Creek, and prospectors have been attracted to the gold bearing veins which a year ago promised remarkable results, but during the past year of 1886 these hopes have been greatly crushed, as many leads which seemed so promising have been found worthless, except with the expenditure of an immense amount of capital. The piercing of the canyons and heights of the Rockies by the Canadian Pacific Railway, now offers better means of access for the heavy machinery necessary, but even yet the cost and trouble of transportation is so great that capitalists cannot be induced to develop these gold veins until they know the results of one large company, which has begun operations on an extensive scale. Still, judging from present authentic information, British Columbia will not be a rich source of gold unless it is found in greater quantity and under more favorable auspices, and those who have foretold the flow of a golden tide from these mines of the Pacific, are doomed to disappointment, or a long waiting for the realization of their prophecies.

The occurrence of gold in the Chaudière Valley, in Quebec, was first noticed in 1835, after which it was seen that nearly every stream would yield gold when the sands were washed. In the Counties of Compton and Beauce, paying deposits have been worked, while mining on the little Ditton River, carried on in a most desultory and primitive manner, has yielded \$100,000. Throughout the Chaudière Valley there are many gold bearing veins, while many feet below the present river, are ancient river channels, which, when reached, have proved to be very rich in coarse gold, and will, without doubt, in the near future, make this valley one of the richest mining districts of Canada. Gol

*Albertainite.

was first discovered in Nova Scotia in 1859, and in 1862, 7,000 ounces were extracted, since then the yield has been high, 400,000 ounces, worth \$8,000,000, having been mined. When it was announced that gold was being found in many places, men and capital poured in, but through reckless and ill-advised systems of mining, failures thickened everywhere. The gold bearing area, 100,000 square miles in extent, reaches from Canso to Yarmouth. The pressure of the ocean bed, as mentioned before, has caused tremendous foldings of the earth throughout this part of Canada, twisting and bending great areas of rock as if so much paper, and great stretches of land have been folded together and thrown completely over. On the summit of these great folds, which have subsequently been greatly worn away by the high action of water, are found the richest veins. The most successful results so far have been attained by small companies, as large corporations with large expenditures have generally met with failure. Indications warrant the expectation that with better experience and skill, these regions, which are certainly rich in gold, will yet become of much greater value and importance.

Silver has been mined in British Columbia, but the chief and most celebrated mines are along the shores of Lake Superior, whither attention was drawn in 1846 by the discovery of silver and copper in the sandstones and limestones. A few companies worked some of these veins for a time, but nothing of much value was done until 1863, when rich discoveries at Thunder Bay again aroused great interest among miners, who met with very discouraging results. In 1868 the Montreal Mining Company sent out a large party under Mr. Thomas McFarlane to survey and examine this wilderness of rock and forest. Many veins of silver and copper were found, and one day, while an assistant was planting his picket for the surveyor on a small rock three-quarters of a mile from the main bend, he noticed a vein rich in lead ore. On blasting near the water's edge rich nuggets of silver were found, and on looking down through the clear crystal waters of this lake, the excited explorers could trace a large vein running far out into the water; detaching and fishing up blocks of the rock, they were found to be rich in lead, while further examination disclosed the great wealth of silver and the most famous silver mine in Canada, Silver Islet, gave up the secret of its hidden treasure. Silver Islet was a small island only 40 feet across at its greatest width, being the summit of the hard quartz vein just appearing above the water, and before operations could be begun, it was necessary to build up all around to keep out the water and to make room for the mills and wharves. This was a source of great trouble, as the island being only 8 feet above the lake, was exposed to the full fury of the gales and the force of the moving ice, which again and again crushed in the crib-work though

it was massively built. Between the years 1870 and 1878 \$3,000,000 worth of silver was sold, and up to 1884, when work was suspended at a depth of 1,230 feet, \$6,500,000 had been extracted from this mine, which ranks among the famous mines of the world.

This closes a rapid and very imperfect summary of the mines of this Dominion. The endeavour has been made to give a few facts about these metal industries, with their present condition and future prospects, as well as the factors or influences which affect and control their destinies. Canadian capitalists, taught by experience, or rather the fruits of inexperience, and the many failures, have become exceedingly wary when allured by tempting offers of mines fabulously rich, and many really valuable and safe properties now remain idle which would yield fortunes if judiciously and sensibly managed. Among the world's industries, none, perhaps, is so uncertain, so liable to failure as that of mining, as there are so many elements of failure with which to contend; and many unsuccessful ventures have been ruined by sheer hard luck.

A traveller through the mining districts of Colorado will see the waste of millions of money scattered through the canyons and along the hillsides, with nothing left to account for the vanished wealth but buildings of useless machinery and a hole in the ground. Such can be seen in Canada. Along the shores of the Lake of the Woods stand monuments to the folly of inexperienced men, who, believing they had found wealth untold, rushed in with machinery and mining appliances worth many thousands of dollars, which any engineer, or anyone familiar with mining, would have at once told were totally unsuitable for their particular kind of ore. Is it any wonder then that these men did not realize their golden dreams, and that now all these valuable mills stand idle and valueless, with the capital all dissipated. This has been the great cause of mining failures in Canada and elsewhere. Companies, instead of securing competent and expert advisers and spending several thousands of dollars in learning the real extent and value of their property, have gone on with their work, trusting to their own judgment and imperfect knowledge, believing that a certain system of mining, successful in another locality, will exactly suit their own, a fallacy to which many a ruined man will attest.

For all this Canadian mines offer many incentives to the miner. This part of her great natural resources will certainly be a valuable and most important factor in her future destiny, and will aid, greatly, in making her the great nation she promises to become.

A British government blue-book has been issued, containing detailed reports relating to the ownership in minerals and mining rents and royalties in France, Germany, Austria-Hungary, Italy, Belgium, Portugal, Spain, Sweden and Norway, and the United States.

Use of the Magnetic Needle in Exploring for Iron Ore.

By Mr. B. H. Brough, Assoc. R.S.M., F.G.S., F.I.C.

[Reproduced, by permission of the author, from a paper submitted to the Iron and Steel Institute, Lon. Eng.]

As a general rule, geological and mineralogical methods alone are used in exploring for ore deposits; only in a few exceptional cases are physical methods possible. Thus in exploring for magnetic iron ores the compass may afford valuable aid, and has, in fact, been employed for this purpose in Sweden and the United States for many years.

The theory of its use is based upon the fact that certain minerals deposited in the earth become magnetic by induction under the influence of the earth's magnetism, and that, consequently, the two poles are fixed in the direction of the magnetic inclination at the opposite ends of the deposit. It is well known that there are substances, such as steel and magnetite, exhibiting polar magnetism: that is to say, they retain the magnetism once acquired even if the inducing force ceases to act. Other substances, such as soft iron and magnetic pyrites, exhibit simple magnetism; in other words, they are magnetic only so long as the induction remains.

The intensity of the magnetism exhibited by deposits of magnetite varies greatly, and is frequently so slight that only delicate instruments and practised observers can detect it; in other cases the needle is affected at considerable distances. It must, of course, be remembered that a given magnetic force affects the needle to exactly the same degree through 100 feet of granite as through the same distance of air.

If the magnetic north pole of the earth is regarded as negative, and the south pole as positive (in the northern hemisphere), the upper end of a vertical mass of ore will be negative, and the lower end positive. Consequently, if a magnetic needle is brought near the upper or negative pole of the deposit, the north-seeking or positive end of the needle will be attracted. When the point of observation is very near the ore-pole the needle will dip downwards. The lower or positive pole of the ore-mass, being usually situated at a considerable depth, will not affect the observation. Other deposits, coursing in a more or less easterly and westerly direction, are less affected by induction; the poles being situated in the long sides of the deposit. Frequently the deposits are faulted and broken. In this case the separate portions behave like fragments of a broken bar magnet, the adjacent ends exhibiting opposite polarity. In exploring for ore, then, if, on advancing from north to south, the free needle is first attracted and then repelled, a fault in the deposit is indicated.

To explore for ore the ordinary miner's dial or surveyor's circumferenter may be employed. If a straight line is followed with the instrument, the needle will remain directed towards the same point of the dial; or, in other words, will remain in the magnetic meridian as long as it is kept sufficiently far away from iron and magnetic ore masses. But if these are approached, the needle will gradually be deflected. The only case in which there will be no deflection is when the attracting deposit is approached along the meridian passing over its upper pole. It follows that in magnetic surveys the meridian line must be found, and fixed in the field or on the plan. For this purpose at least two straight lines are set out in the magnetic east and west direction, from thirty to fifty yards apart. These lines will at

some point cross the meridian line. If the dial is set up at one end of a line of this kind, at a considerable distance from the magnetic mass, there will, of course, be no attraction. On approaching the meridian the needle will be gradually attracted, and at a certain distance the maximum attraction will be reached. On approaching nearer it will become smaller, until, at the ore meridian itself, it will be inappreciable. The angles of deflection observed at the various stations are noted on pegs driven into the ground, and also in the field-book, or in the plan. Following the same straight line to the other side of the zero point—or, what is the same thing, to the other side of the ore meridian—the same attractions are exhibited, but in reverse order; the needle turning back to the meridian. If similar observations are made along the second east and west line it is easy to fix the ore meridian by joining the two points where there is no deflection. These points are midway between the two points of maximum deflection. This passes over the upper pole of the deposit, and if the pole is approached along the meridian line the dip of the north-seeking end of the needle will, as a rule, be greater the nearer it comes to the pole. This method is, however, not adapted for fixing the position of the pole exactly. This may be done by determining the isogonic lines—that is to say, by joining the points where the needle has the same deflection.

In order to obtain one or more parallel isogonic lines on both sides of the ore meridian, it is necessary to set out a number of lines parallel to the ore meridian, and from ten to thirty yards apart. At the points where these lines intersect the east and west lines, the angles of deflection must be observed, and isogonic lines constructed by joining the points of equal deflection. The needle being drawn so much out of its horizontal position that its free play is hindered, it must be weighted and balanced by a piece of wax. If, now, from some point of intersection in the network of squares made on the field of observation, a line is drawn in the direction of the deflection of the magnetic needle, it will cut the isogonic curve at a second point, and, eventually, the ore meridian. The two points where the isogonic line is cut are joined; the joining line is bisected, and at the point of bisection a perpendicular is erected; then, perpendicularly under the point where this cuts the meridian, is the upper ore pole, and at this point it will eventually be found best to sink the shaft, so as to be certain of cutting the ore mass. The ore meridian, it must be noted, need not always be a straight line.

In cases where a better instrument was not available, excellent results have, in this way, been obtained with the ordinary pocket box compass, held in the hand.

For preliminary magnetic surveys, no instrument is better than the Swedish compass. In this instrument, the needle, besides revolving in a horizontal plane in the usual manner, can also turn in a vertical plane to an angle of about 60° with the horizon. The needle is horizontally suspended in a brass case on a long vertical brass pin by means of a long glass cap. The brass terminates above in a short steel point, on which the glass cap rotates. At the bottom of this is a brass stirrup, provided with fine holes, through which pass the horizontal pins supporting the needle. To enable the needle to dip, there is a long slot cut along the middle of it. The compass box can be suspended by means of three strings passing through three small rings fastened 120° apart on the outside of the box. It can thus be easily carried in the hand.

Graduation is not usual, and indeed unnecessary. Only the cardinal points are marked, as in using it, deviations from the horizontal position alone have to be noticed. This compass was invented in the last century by the celebrated Swedish miner, Daniel Tilas, and is still in general use. The dip of the needle is estimated merely by the eye, and is not actually measured.

The miner's or dip compass was invented in the United States in 1866, and was adopted by the Geological Survey of New Jersey in the systematic explorations for magnetic iron ore in that State. In this instrument the magnetic needle is suspended so as to move readily in a vertical direction; the angle of inclination being measured upon the divided rim of a small compass box. The needle cannot move horizontally. When in use, the ring is held in the hand, and the compass box, by its own weight, takes a vertical position. It must, of course, be held in the plane of the magnetic meridian, which can be determined by holding the instrument horizontally. In this way it serves as an ordinary pocket compass. Messrs. W. & L. E. Gurley, of Troy, New York, make several different forms of this instrument. That with a 3-inch needle has the two sides of glass, and is provided, when desired, with a stop for the needle. Another form has a brass back and cover, and a $2\frac{1}{2}$ -inch needle. Another represents an improved compass by the same makers. It is a modification of Swedish compass, and has a needle 3 or 4 inches long, resting upon a vertical pivot so as to move freely in a horizontal plane, and thus place itself in the magnetic meridian; while being attached to the needle-cap by two delicate pivots, one on each side, it is free to dip. It is usually provided with brass covers on both sides.

With the dip compass, whether Swedish or American, perfectly trustworthy results can only be obtained when the observer is acquainted by long experience with the peculiarities of his instrument. Compass explorations being in many cases the sole source of income, it can easily be understood that a skilful operator will be inclined to keep his mode of procedure secret. Consequently the uninitiated are apt to believe that the operator must be specially gifted; and frequently the supernatural properties formerly ascribed to the divining rod are transferred to the compass. This excess of faith in some is accompanied by scepticism in others. For this, unfortunately, there are good grounds; the compass being so admirably adapted for dishonest purposes. Thus, Mr. T. B. Brooks mentions an American prospector whose compass needle in the vicinity of an ore mass always showed a dip of 90° when facing west, and the true dip due to local attraction when facing east. The former position, it is said, was very successfully used in selling iron ore grounds, and the latter in buying them. Similarly in Sweden a powerful magnet inserted in a walking-stick has been successfully employed to give a large dip to the needle when it was thought desirable to mislead the purchaser.

As a rule, surveyors assume that the most ore must occur where the tip compass shows the greatest inclination, or is perpendicular. This assumption, however, is erroneous. The place where the needle is attracted most by a vertical ore bed is not directly above, but to the north of, the south pole of the deposit. For, if the magnetism of the earth is powerful enough, there must be somewhere north of the ore pole a point at which the horizontal components of the magnetism of the earth and of the ore bed are equally powerful, but acting in opposite directions. At this point the horizontal forces neutralise each other, and then the

vertical forces of the magnetism of the earth and of the ore bed tend to bring the needle into a vertical position.

The evidences afforded by the needle often lead to error. An unimportant pocket of ore near the surface may have as great an action on the instrument as a larger ore mass situated far below the surface.

It is thus seen that in exploring for iron ore, with the magnetic needle, a purely scientific method is necessary. The compass should be employed for preliminary work, in order to save time and labour; but before a shaft is sunk, recourse should be had to a more accurate method. Improved methods, available for the purpose, have been devised by Brooks, Wrede, Thalén, and Tiberg.

BROOKS' METHOD.

Mr. T. B. Brooks, of the Geological Survey of Michigan, in exploring for iron ore, determined with a pocket compass variations east or west; the bearings of a standard line being taken as in ordinary surveys. The inclinations or dips were observed on the dip compass held in the hand in the plane of the meridian. Sometimes observations were made with the compass held at right angles to this position, that is, facing north and south. The instrument was always held in the hand and levelled by its own weight. The intensity of the magnetic force for the three positions of the compass was measured by the number of oscillations made by the needle in a unit of time, usually taken at a quarter of a minute. No attempt was made to eliminate the earth's attraction by neutralising it with a magnet while the observation was being made, nor by computation; and the great amount of friction in the compass renders the number of oscillations only an approximation to the number that would be obtained with a delicately mounted needle. Mr. Brooks has, however, done excellent work with this method in the Marquette region and in New York and New Jersey. He also describes another method of working, which he calls magnetic triangulation. The mode of procedure is as follows:—Remote from any magnetic rocks, neutralise, by means of a bar magnet, the earth's influence on the needle of a solar compass. The needle will then stand indifferently in all directions. If the compensated instrument is set up near the magnetic pole to be determined, the needle will point as nearly towards the local pole as its mode of mounting will permit. The operation being repeated at two other points near the magnetic pole, the three lines must intersect in one point, which will be directly over the pole of which the position is sought. By using a dip compass in a similar manner, data to determine the depth would be obtained. The fact that several local poles often influence the needle at each station renders this method difficult in practice; a place must be sought where but one strong pole exists.

To be continued.

Electricity in Coal Mining.

A number of gentlemen interested in electric lighting met lately in London to witness the capabilities of the "Eclipse" portable electric battery, which, with its low-resistance lamp, has already been tested with gratifying results on the Great Western Railway and elsewhere. The lamp is suitable for domestic illumination, and is said to be the safest and most economical electric light in existence. It is also adapted for railway signals, private carriages, omnibuses, &c. It is conspicuous as a miner's safety lamp, and only weighs 4 lb. or 5 lb. The battery is

charged with the simplest ingredients, viz.: sulphuric acid and common soda, and while the battery and lamp may be obtained for a few shillings, the cost of the charge is only 2d., and it will last for 24 hours. Dr. Silvanus P. Thompson, speaking of the qualities of the "Eclipse" electric battery, and of the miner's lamp in particular, said that a short time ago he, with many other gentlemen, was engaged on the Woolwich Commission in the inspection of 200 different miner's lamps, and that when the test of blowing them up was tried, not a single one would stand the test. He added that there are 100,000 miners injured every year, not only by explosions, but many other causes which arise entirely from deficient light. In the "Eclipse" miner's lamp the light was thrown upwards as well as sideways, and, even if it were true, which it is not, that it cost ten times as much as the ordinary safety lamp, he thought it ought to run the ordinary safety lamp out of existence. He could verify the statement that the batteries would run at least 13 hours. That in itself was quite sufficient to show the advantage of this over the ordinary miner's lamp. Dr. Thompson stated it was quite impossible to blow the lamp up, and that it could not possibly cause an explosion.

PHOSPHATE

The following shipments of Canadian ore have been made from Montreal for month ending 30th June 1887:—

Date.	Shippers.	Ship.	Destination.	Tons.
May 30	Lomer, Rohr & Co.	s.s. Gratitude.	London....	100
June 1	"	s.s. Southwold.	do	240
" 2	"	s.s. Aleides....	Glasgow....	75
" 7	Anglo Canadian Phosphate Co.	s.s. Katie.....	London....	220
" 12	Wilson & Green..	s.s. Bannington..	Liverpool..	300
" 14	"	s.s. Titania....	do	74
" 14	"	s.s. Castledale..	London....	247
" 19	Anglo Canadian Phosphate Co.	s.s. Castledale..	do	110
" 19	Lomer, Rohr & Co.	s.s. Ocean	do	100
" 19	Wilson & Green..	Prince..	do	98
" 22	Anglo Canadian Phosphate Co.	s.s. Concordia..	Glasgow....	125
" 23	Lomer, Rohr & Co.	s.s. Merchant's	London....	200
" 23	Anglo Canadian Phosphate Co.	do ..	do	160
" 24	Lomer, Rohr & Co.	s.s. Black	do	109
" 24	Millar & Co.....	do ..	do	200
" 28	"	s.s. Bayswater..	do	90
" 28	Lomer, Rohr & Co.	do ..	do	190
" 29	Wilson & Green..	s.s. Ovenholme	Liverpool..	661
" 29	"	Bar. Lady Dufferin.	London....	240
" 30	Lomer, Rohr & Co.	s.s. Waudraham..	do	40
" 30	Millar & Co.....	do ..	Hamburg..	250
" 30	Anglo Canadian Phosphate Co.	do ..	do ..	94
" 30	Lomer, Rohr & Co.	s.s. Colina.....	Glasgow....	190
Total....				4,153

LATEST ENGLISH QUOTATIONS.—MINERAL PHOSPHATES.—There is a fair enquiry for High Class Canadian, but very little offers at present. It is, however, expected that now the fine weather has set in, Raisers will soon be in a position to estimate their production, and the quantity they may have to sell over the Summer season. The price for South Carolina Phosphates has advanced with the rise in Steam Freights, and 7½ to 7½ per unit is now the quotation for River and Land, according to the quantity required. Belgian Phosphate—little has been doing during the month,

Raisers of 40/45 per cent. declining to sell more at late prices, and with two more Works lately producing the material closed, it is much scarcer. The higher grades are offering freely, and we could contract for next season on favourable terms. Somme Phosphate of all (except 75/80 which is firmly held by the two Raisers producing it) is offering at lower prices; several of the smaller Manufacturers are getting into difficulties with the Iron and Alumina guarantee.

Owners of phosphate properties have been much encouraged by latest advices, which announce sales at 1s. per unit, which is equal to £4 per ton.

The Templeton & Blanche River Phosphate Mining Company commenced operations on their property early last month, and so far the management are well pleased with their prospects. The deposits owned by the company are located on lot 7, on 11th Concession, half of lot 6, on 8th Concession, and lot 5, on 9th Concession, Township of Templeton. The work, which at the outset was somewhat scattered, is now being concentrated at two special points and will now be conducted vigorously.

At the Otty Lake Mines five pits are now being worked, and others will shortly be opened. One of the pits has been producing a high grade red phosphate until lately, when a change took place in the character of the vein, and now the product of the pit is composed of a beautiful green phosphate of a very high grade. The pit is about 45 feet deep and is worked by one of the steam cranes used some years ago by the Montreal Steam Crane Co. in unloading ships on the wharves at Montreal. Another pit, opened about two weeks ago, is on a vein of phosphate and calcite. The phosphate occurs in seams and pockets in the calcite; and near the surface cavities are found containing on their floors large quantities of fragments of crystals which require only to be shovelled out.

Mr. F. Van Bruyssel, the Consul-General for Belgium, has paid us a visit with the object of obtaining as full information as possible regarding our phosphate deposits. Samples of the ore taken from the leading Canadian mines were given him, and these, we have since learned, have been forwarded to His Excellency Prince de Chemay, Minister of Foreign Affairs, Brussels. The quantity of fertilizers used in Belgium is much greater than we had any conception of.

At the High Rock Mines about 600 tons of high grade ore have been raised during the past month. The management hope to ship over 8,000 tons during the season. Mr. Pickford, Sr., has been at the mines for over a month and states that the pits are looking very well and that everything goes smoothly. A "chute" has been constructed from the end of the tram line over the river bank, which will greatly facilitate the loading of the ore.

Mr. McIntosh has resigned his position at the Union Mines. He will shortly open up his property near High Falls.

The shaft at the North Star Mine has reached a depth of 600 feet, and is still showing a fine vein of ore all the way down. The management are very busy moving their output to the river, which is some four miles from the mines.

About 400 tons of ore per month is being shipped to Montreal from the Union mines. Capt. J. E. Smith has entire charge of the mine.

The tram line at Little Rapids is proving a most successful acquisition, and the ore at this valuable property is now being handled with great facility. Five men can by this means load a scow with 70 tons of ore from the mines in seven hours. As the majority of the hands have been employed on the work of constructing the tramway, the output during the month is somewhat below the average.

Mr. Boyd Smith, of Washington, D.C., who is engaged phosphate mining at Charbot Lake, Mr. Pickford, Sr., and others interested in phosphate mining, paid a visit to this property on 11th inst. They were particularly impressed with the mode of cleaning the ore and expressed themselves much pleased with the working of the property.

At the Emerald Mine a very steady output of high grade ore continues, and the prospects for the season are bright. About 500 tons are being shipped per month.

Work on the new Locks near Little Rapids has at last been commenced. The improvements are badly wanted and it is to be hoped there will be no further delay in the work of immediate construction.

The Canadian Pacific Railway are doing everything in their power to meet the requirements of the miners in the transportation of their ore. Managers report themselves as much pleased at the improved facilities given them by the road since last year.

MINING NOTES.

Nova Scotia.

New Glasgow, says an exchange, is growing to be a busy place. Within a circle of two or three miles there are half a dozen collieries employing 1,700 or 1,800 men, while the glass works, steel forges, foundries, plough works, carriage factories and other smaller industries furnish profitable employment for 1,000 hands. The Short Line Railway gives it closer connection with the West, and if all the expectations of the enterprising men who have built high hopes on the future of New Glasgow are realised it will become the Newcastle of Canada. When Nova Scotia decides to replace its wooden ships by iron and steel, New Glasgow and vicinity is the locality where it will be done, as the material is there and only requires the necessary energy and capital.

Gold mining, says the *Critic*, is being vigorously pushed in all the gold districts in the Province, and with most encouraging results. In Yarmouth County, the Kempt Gold Mining Company are pushing operations on a more scientific scale than before, and from all accounts the Company are likely to be richly rewarded for their determination. The Cowan Mining Company has a splendidly equipped mine and it is reported that the property is about to be sold at a good high figure. Prospecting is being vigorously pushed, and new finds are likely to be reported at any moment.

The official returns for the month of June are as follows:—

District.	Mill.	Tons Crushed.	Oz. Gold.
Tangier.....	Mooseland.....	21½	15½
Sherbrooke...	Miners'.....	25	8½
".....	Goldenville.....	52	8
East Rawdon...	Rawdon.....	350	342
Lake Catcha...	Oxford.....	93½	138½
Brookfield...	Brookfield.....	200	122½
Whiteburn...	Cnsling C. M. Co..	20	53½

New Brunswick.

The manganese property, at White's Mountain, is reported to be showing up well. It is thought that probably \$2,000 worth of ore is on the dumps.

It is understood that efforts are being made to form a joint stock company with a view to operating the manganese property at Petitcodiac.

Quebec.

Our correspondents from the Asbestos districts write:—"We have nothing special to report in Asbestos. Operations have been prosecuted steadily since our last with the exception of some interruption last week from local heavy rains. Men are getting scarce just now, many being employed haying, which has been commenced by the farmers. Prices on Crude Asbestos remain the same and there is a somewhat larger demand this year."

The Oxford Copper and Sulphur Company, of Capelton, Que., Bayonne, N. J., and New York, have suspended payment, but are maturing plans by which they expect to resume business and pay up their liabilities of \$600,000 in full. The company owns valuable copper mining property in Canada and the earnings during the last year showed a fair profit, which was devoted to improving the plant and developing the mines. The company have a large stock of copper on hand at their smelting works at Bayonne, as well as valuable mining lots at Capelton, so that the failure is not expected to turn out a bad one, and a fair dividend may be confidently looked for.

Ontario.

The properties owned by Messrs. Jenkins & Chambers in 18th, 2nd, 8th and 15th concessions of Wollaston give promise of being the most extensive iron deposits yet discovered in Ontario. The Station mine shows a continuous length of over 1,500 feet with a width varying from 20 to 100 feet. A Government analysis of ores from the 2nd concession shows 56 per cent. metallic iron with no injurious elements. The deposits in the 2nd and 15th concessions are still larger than that mentioned. It is to be regretted that lack of capital prevents the full development of these very promising deposits.

The *Journal of Commerce* of 8th inst. announces that:—

"A syndicate composed of Milwaukee and Chicago capitalists, of whom Hnstis, Coughlan and Ray are the representatives, recently purchased a tract of 200 acres of mineral land in the Township of South Crosby, Leeds County, Ontario. They have been doing some prospecting, and some samples of ore were received in Chicago this week, and the company at once received an order for 1,000 tons at \$6 per ton from a Chicago steel company."

There is nothing to report from the Bristol Iron Mines. We hope to give our readers some idea of the progress being made there in our next issue.

A discovery of exceedingly rich native silver has been made on Pitch River, on a location owned by the Ottawa Mining Company.

Another vein of gold is reported to have been found on the property owned by Mr. Coffee, near Sudbury.

PORT ARTHUR DISTRICT.

The mines in the vicinity of Thunder Bay are deservedly attracting considerable attention at the present time, for every day brings fresh evidence of the unquestionable richness of that vast mineral region. Latest advices report a very rich discovery of silver, which has been made at Atick Lake, about fifteen miles west of Silver Mountain and within two miles of the present terminus of the located lines of the Port Arthur, Duluth and Western Railway. The fortunate possessor of what is an undoubtedly very valuable property is Mr. W. A. Allan, of Ottawa, who is bound to realise handsomely on his investment. He will develop the property forthwith. We understand that Mr. Allan's agents are still prospecting in the Whitefish Region. Their reports indicate that further discoveries will very shortly be made public.

Another new find has been made about ten miles west of Silver Mountain and about half a mile north of the railway route and immediately east of the property now being worked by the Queen Mining Company of St. Paul and across whose property, as well as the adjacent one in the east, owned by Mr. Dounais, the vein runs. This has been secured by one of our enterprising merchants who was pointed out the vein by a brother of the celebrated Louison, the discoverer of the Rabbit and Silver Mountain mines.

Messrs. Eschweiler & Buchanan are getting out rich ore from their property near the Porcupine mine.

The Ontario Silver Mining Company has been organised at St. Paul, where the principal office will be, with a capital stock of \$2,000,000, shares \$5 each, to work property located at Location R 146 and R 147 in Thunder Bay District. The officers are: Edward H. C. Taylor, President; Robert M. Fulton, Vice-President; Albert K. Murray, Secretary; Thomas Tyrer, Treasurer.

Manitoba and North-West Territories.

As already announced the Galt Coal Mines at Lethbridge have been temporarily closed down owing, it is claimed, to the arbitrary action of the miners. An association was formed by the miners some time ago, and owing to the distance of the mines from any centres of population, and the difficulty of obtaining men, the employees have had things practically their own way. Their action at last became so unbearable that the Company decided to close the mines, until new men could be procured from the East. A sufficient supply of coal is on hand to fill requirements until work can again be started. The *Athabasca*, which arrived at Port Arthur on the 5th, brought up seventy miners from Columbus, Ohio, who are going to work in these mines.

Shipments of coal from the mines of the Canadian Anthracite Company, at Banff, are being vigorously conducted. Winnipeg and San Francisco are the points so far to receive the largest consignments.

British Columbia.

A dispatch from Sand Point, Idaho, says: "The first shipment of silver ore into the United States from British Columbia was made on 15th June, from Kootenai, a flag station four miles east of this point on the Northern Pacific Railroad. The ore goes to Montana for reduction, and runs about 400 ounces of silver per ton. It was shipped from the Krao mine, on Kootenai Lake, British Columbia, by one of the owners, A. D. W. Wheeler."

The 80 stamp quartz mill for the Alaska Union Mining Company, on Douglas Island, has arrived from San Francisco.

A valuable discovery of platinum is reported at Granite Creek.

Letters from Big Slide state that the river is receding and that the works at the Foster mines had not been damaged, only the lower floor of the chlorination works having been under water for three or four days. The difficulty in chlorinating the concentrates had been partly overcome, a tub having been "gassed" in nine and a half hours. The tailings show a heavy loss in gold, and steps have been taken to ascertain the reason of the loss and check it.

The *Colonist* states that an immense deposit of finest lime has been located on McDonald's farm, near Agassiz station. A company has been formed for the purpose of bringing it into market, and kilns are now being built for that purpose. It is most conveniently situated, for it can be loaded on steamer or scow direct from the kilns, and a tramway can readily be built to the railway line.

Copper has been found in the Blind River district. The find is reported valuable.

Mineralogy, Geology & Science.

All correspondence under this head, and scientific exchanges, must be addressed to the Science Editor, Canadian Mining Review.

The Correlation of the Animikie and Huronian Rocks of Lake Superior.

By Peter McKellar, Esq., Fort William.

In his excellent paper upon this subject read before the recent annual meeting of the Royal Society of Canada, Mr. McKellar, who has had over twenty years practical experience among the rocks of both sides of Lake Superior, gave convincing evidence of the true relations of all the rock formations of these regions. In his opening remarks he referred to the diversity of opinion that of late years has existed among American geologists who have combatted the stratigraphy of the rocks of the North Shore, as defined by Logan and other Canadian geologists alleging that the lower group of the upper-bearing series of Logan (now called Animikie) is identical with the Huronian. Mr. McKellar shows the general dissimilarity of the two formations and then proceeds to give an analysis: First, of the lithological features and secondly of the stratigraphical arrangement of each, by which their strong contrast is brought out. His intimate knowledge of every part of the ground covered makes it impossible

to controvert his facts, and his reasoning is conclusive and entirely favourable to the position taken by our geologists. The Huronian rocks of the different areas north of the great lakes differ more or less from one another, both as to the presence or absence of some of their lithological constituents, and in relative volumes or proportions of certain kinds of rocks which may be present: but in the main Mr. McKellar thinks that the general lithological difference between these areas may be considered as of degree and not of kind. "No good reason," he said, "has yet been shewn for considering any of them as entitled to a separate classification. To attempt to do so, in the present state of our knowledge, would only lead to confusion. The so-called 'Typical Huronian of Lake Huron,' contains the same kinds of rocks as the 'Huronian areas' of Lake Superior, although the quartzites are in relatively larger volumes, and possibly part of the former series may prove to be a little newer than most of the latter. If the Lake Huron quartzites and their associated rocks could be shewn to belong to a formation distinct from all the rest of the rocks which have been classified as Huronian, it might then become difficult to prove their chronological relation to the Animikie formation. Stratigraphy would give but little aid in ascertaining their relative positions, if their equivalency with the Huronian schists of Lake Superior were in doubt. But I believe that almost all geologists are agreed, Prof. Irving among the number, that they belong to the same system. The somewhat lower angles of dip than the average in part of the Lake Huron region, and the relatively large development of the quartzites are the circumstances which have caused doubts in the minds of some who have lent limited personal knowledge of the Huronian system as to their equivalency with the rocks of the age on Lake Superior, which are generally more schistose. But many other examples could be given of low dips in various Huronian regions. Again the quartzites of Lake Huron are conformatibly associated with great volumes of crystalline Schists, apparently identical with those of Lake Superior. The white and gray quartzites of different shades are met with in the Huronian bands north of Michipicottau, at Red Lake (to the north Lake of the Woods) and elsewhere. Dr. Bell has shewn that they exist in *great force* among rocks of the ordinary Huronian types on the North-West Coast of the Hudson's Bay. My personal knowledge of the rocks of Lake Huron is not so complete as that of Lake Superior, but from the descriptions of Sir William Logan and others and what I have myself seen on the Lake Huron Strata, the greenstones and schists of the formation there appeared to me to be precisely the same in character as these equivalents on Lake Superior, and they are not in the least like the rocks of the Animikie formations. Even the veinstones of the former region are markedly of the Lake Superior Huronian type and quite different from those of the Animikie series. My impression is that the original Huronian of Lake Huron can never be shewn to be equivalent to the Animikie, any more than the Huronian of Lake Superior. They must either be classified with the last mentioned or as an intermediate formation." Incidentally connected with this question is the relation of the Animikie group to the Keeweenawian, and on this subject Mr. McKellar stated the results of his own observations. These questions are of great economic importance in connection with the occurrence of native copper in the Keeweenawian, of silver in the Animikie, and of iron in the Huronian series.

FOR SALE. VALUABLE. Copper Mining Properties — IN THE — Eastern Townships

TOWNSHIP OF ASCOT.

- 1st. Clark Mine, Lot 11, R. 7 Ascot 187 acres
2nd. Sherbrooke Mine, part Lots 12 and 13,
R. 7 Township of Ascot..... 329 "
3rd. Belvidere Mine, part Lots 9 and 10, R.
9 and 10, R. 8 Ascot 292 "
4th. Mining Rights in same vicinity on..... 250 "

All of the above properties lie within $1\frac{1}{2}$ miles of the Village of Lennoxville, at the junction of the Grand Trunk, Canadian Pacific and Passumpsic Railways, and have been developed to a considerable extent, and veins opened 6 to 20 feet in width, yielding 3 to 5 per cent. of copper, also silver, and 35 to 40 per cent. of sulphur. These mines are only $2\frac{1}{2}$ to 3 miles distant from the City of Sherbrooke, and evidently are of the same class of ores found at Copelton, only four miles distant, owned and worked by the Orford Copper and Sulphur Company, and by Messrs. G. H. Nichols & Co., of New York, which have proved so remunerative.

TOWNSHIP OF ORFORD.

- 5th. Carbuncle Hill Mine, Lots 2 and 3 R. 14, and 2, 3, 4 R. 15, 718 acres. Same class of ore as is found in the Ascot properties above described, but yielding a higher percentage of copper.

TOWNSHIP OF CLEVELAND.

- 6th. St. Francis Mine, $\frac{1}{4}$ Lot 25 R. 12, 50 acres, with dwelling houses, smith's shop, ore sheds and office, large winding and pumping steam engine, with boiler, winding and pumping gear, and about forty fathoms Cornish lifting pumps complete, railway tracks, ladders, etc., situated three miles from Grand Trunk Railway. A considerable amount of mining work has been done at this mine. A well defined vein richly charged with vitreous purple and yellow sulphurets of copper traverse the entire length of the property, five feet in thickness, yielding 8 to 40 per cent. metallic copper.

TOWNSHIP OF GARTHBY.

- 7th. Fifty-six lots of land, 2,938 acres. This property for the most part is unexplored, but copper is found on the greater part of the property. On one of the lots a vein about twenty feet in width has been found. Samples of the ore have yielded as much as 22 per cent. of copper, being also rich in sulphur. Other samples of pyrites from the same property, free from copper, have yielded as high as 48 per cent. of sulphur. The only drawback to this property is in its distance from the railway, it being about four miles from Garthby Station, Quebec Central Railway. A new line is chartered, however, which, when built, will run directly through the property.

TOWNSHIP OF ACTON.

- 8th. The Acton Mine, 100 acres, with engine, boiler, pumps and appliances. Within three years after this mine was first opened it produced nearly \$500,000 worth of copper. It is situated about half a mile distant from the stations of the Grand Trunk and South Eastern Railways.

- 9th. Brome Mine, part Lots 2 and 3 R. 4, 50 acres.
10th. Bolton Mine, two miles from Eastman Station, Waterloo & Magog Railway, 400 acres.

The above properties formerly belonged to the Canadian Copper and Sulphur Company, and were acquired by the present owner at sheriff's sale, giving an indisputable title thereto.

The whole or any portion of the property will be sold at reasonable prices.

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Mining Regulations

TO GOVERN THE DISPOSAL OF

Mineral Lands other than Coal Lands,

1886.

THESE REGULATIONS shall be applicable to all Dominion Lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, iron or other mineral deposits of economic value, with the exception of coal.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein, either by surface or subterranean prospecting for mineral deposits, with a view to obtaining under the Regulations a mining location for the same, but no mining location or mining claim shall be granted until the discovery of the vein, lode or deposit of mineral or metal within the limits of the location or claim.

QUARTZ MINING.

A location for mining, except for iron on veins, lodes or ledges of quartz or other rock in place, shall not exceed forty acres in area. Its length shall not be more than three times its breadth and its surface boundary shall be four straight lines, the opposite sides of which shall be parallel, except where prior locations would prevent, in which case it may be of such a shape as may be approved of by the Superintendent of Mining.

Any person having discovered a mineral deposit may obtain a mining location therefor, in the manner set forth in the Regulations which provides for the character of the survey and the marks necessary to designate the location on the ground.

When the location has been marked conformably to the requirements of the Regulations, the claimant shall within sixty days thereafter, file with the local agent in the Dominion Land Office for the district in which the location is situated, a declaration or oath setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as aforesaid; and shall, along with such declaration, pay to the said agent an entry fee of FIVE DOLLARS. The agent's receipt for such fee will be the claimant's authority to enter into possession of the location applied for.

At any time before the expiration of FIVE years from the date of his obtaining the agent's receipt it shall be open to the claimant to purchase the location on filing with the local agent proof that he has expended not less than FIVE HUNDRED DOLLARS in actual mining operations on the same; but the claimant is required, before the expiration of each of the five years, to prove that he has performed not less than ONE HUNDRED DOLLARS' worth of labor during the year in the actual development of his claim, and at the same time obtain a renewal of his location receipt, for which he is required to pay a fee of FIVE DOLLARS.

The price to be paid for a mining location shall be at the rate of FIVE DOLLARS PER ACRE, cash, and the sum of FIFTY DOLLARS extra for the survey of the same.

No more than one mining location shall be granted to any individual claimant upon the same lode or vein.

IRON.

The Minister of the Interior may grant a location for the mining of iron, not exceeding 160 acres in area which shall be bounded by north and south and east and west lines astronomically, and its breadth shall equal its length. Provided that should any person making an application purporting to be for the purpose of

mining iron thus obtain, whether in good faith or fraudulently, possession of a valuable mineral deposit other than iron, his right in such deposit shall be restricted to the area prescribed by the Regulations for other minerals, and the rest of the location shall revert to the Crown for such disposition as the Minister may direct.

The regulations also provide for the manner in which land may be acquired for milling purposes, reduction works or other works incidental to mining operations.

Locations taken up prior to this date may, until the 1st of August, 1886, be re-marked and re-entered in conformity with the Regulations without payment of new fees in cases where no existing interests would thereby be prejudicially affected.

PLACER MINING.

The Regulations laid down in respect to quartz mining shall be applicable to placer mining as far as they relate to entries, entry fees, assignments, marking of localities, agents' receipts, and generally where they can be applied.

The nature and size of placer mining claims are provided for in the Regulations, including bar, dry, bench, creek or hill diggings, and the RIGHTS AND DUTIES OF MINERS are fully set forth.

The Regulations apply also to

BED-ROCK FLUMES, DRAINAGE OF MINES AND DITCHES.

The GENERAL PROVISIONS of the Regulations include the interpretation of expressions used therein; how disputes shall be heard and adjudicated upon; under what circumstances miners shall be entitled to absent themselves from their locations or diggings, etc., etc.

THE SCHEDULE OF MINING REGULATIONS

Contains the forms to be observed in the drawing up of all documents such as:—"Application and affidavit of discoverer of quartz mine." "Receipt for fee paid by applicant for mining location." "Receipt for fee on extension of time for purchase of a mining location." "Patent of a mining location." "Certificate of the assignment of a mining location." "Application for grant for placer mining and affidavit of applicant." "Grant for placer mining." "Certificate of the assignment of a placer mining claim." "Grant to a bed rock flume company." "Grant for drainage." "Grant of right to divert water and construct ditches."

Since the publication, in 1884, of the Mining Regulations to govern the disposal of Dominion Mineral Lands the same have been carefully and thoroughly revised with a view to ensure ample protection to the public interests, and at the same time to encourage the prospector and miner in order that the mineral resources may be made valuable by development.

COPIES OF THE REGULATIONS MAY BE OBTAINED UPON APPLICATION TO THE DEPARTMENT OF THE INTERIOR

A. M. BURGESS,

Deputy Minister of the Interior.

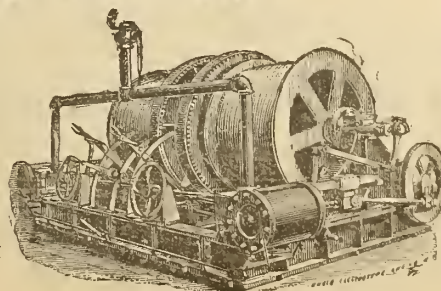
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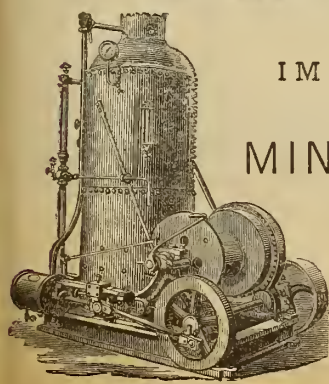
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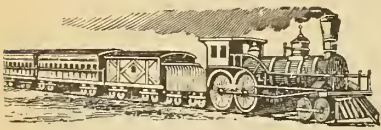
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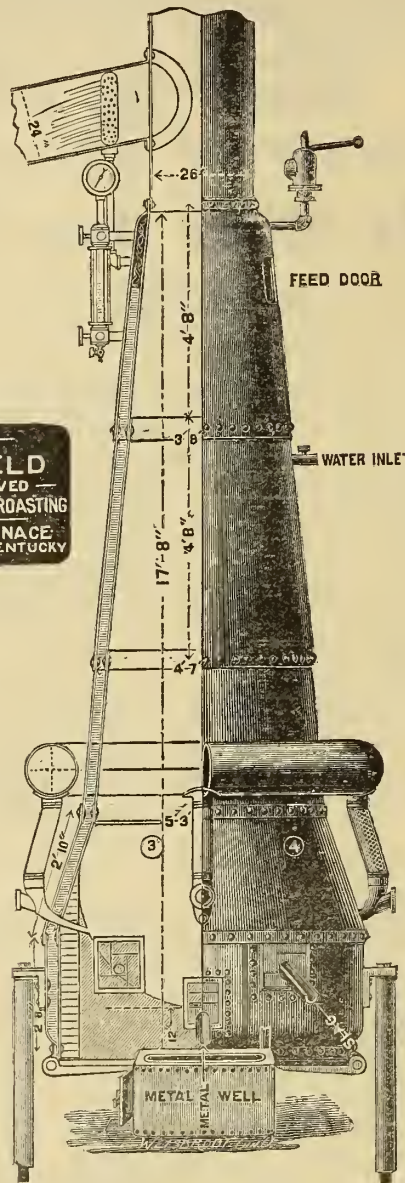
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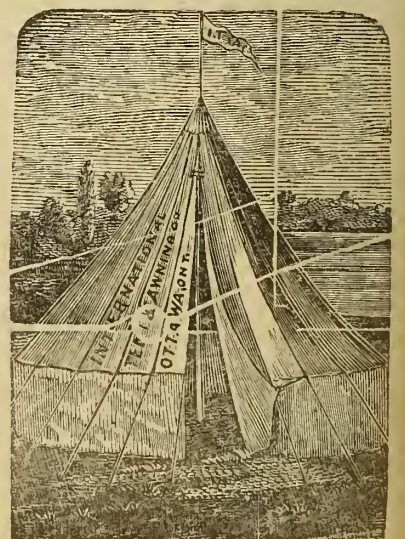
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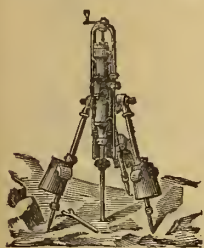


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1887.—OTTAWA, AUGUST—1887.

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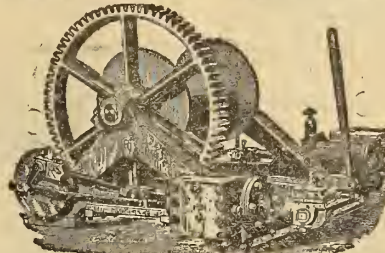


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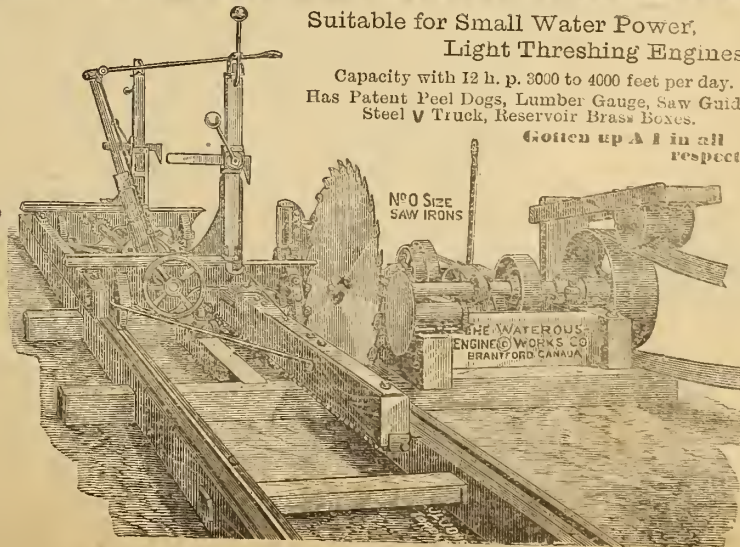
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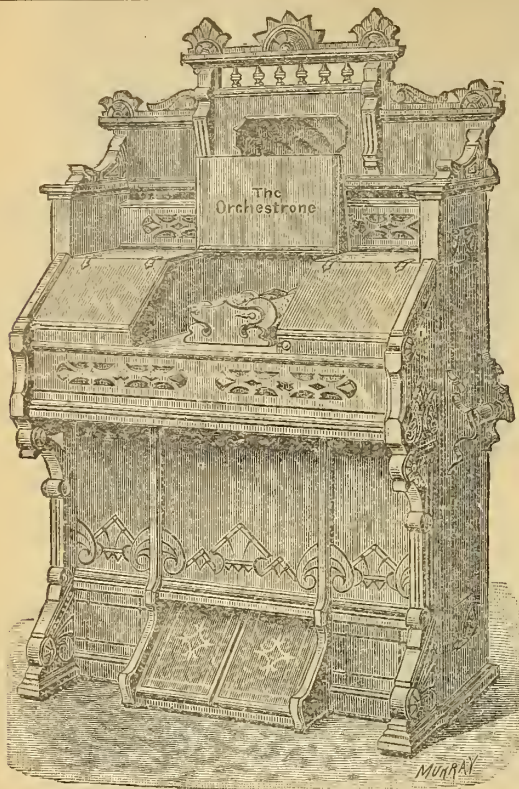
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Notice to Contractors.

SEALED TENDERS addressed to the undersigned and endorsed "Tender for Barn and Stabling at Experimental Farm, near Ottawa," will be received at this office until THURSDAY, 4th August, for the several works required in the erection and completion of the

Barn and Stabling at Experimental Farm, near Ottawa.

Plans and specifications can be seen at the Department of Public Works, Ottawa, on and after Saturday, the 23rd July.

Intending contractors should personally visit the site and make themselves fully cognizant of the work to be done, according to the said plans and specifications, before putting in their tenders.

Persons tendering are further notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque made payable to the order of the Honorable the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party declines to enter into a contract when called upon to do so, or if he fails to complete the work contracted for. If the tender is not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

By order,

A. GOBEIL,
Secretary.

Department of Public Works,
Ottawa, 15th July, 1887.

6-1



NOTICE RESPECTING PASSPORTS.

PERSONS requiring passports from the Canadian Government should make application to this Department for the same, such application to be accompanied by the sum of four dollars, in payment of the official fee upon passports as fixed by the Governor-in-Council.

G. POWELL,
Under Secretary of State.
OTTAWA, 19th Feb., 1886.



Department of Inland Revenue.—An Act respecting Agricultural Fertilizers.

The public is hereby notified that the provisions of the Act respecting AGRICULTURAL FERTILIZERS came into force on the 1st of January, 1886 and that all Fertilizers sold thereafter require to be sold subject to the conditions and restrictions therein contained—the main features of which are as follows:

The expression "fertilizer" means and includes all fertilizers which are sold at more than TEN DOLLARS per ton, and which contains ammonia, or its equivalent of nitrogen, or phosphoric acid.

Every manufacturer or importer of fertilizers for sale, shall, in the course of the month of January in each year, and before offering the same fertilizer for sale, transmit to the Minister of Inland Revenue, carriage paid, a sealed glass jar, containing at least two pounds of the fertilizer manufactured or imported by him, with the certificate of analysis of the same, together with an affidavit setting forth that each jar contains a fair average sample of the fertilizer manufactured or imported by him; and such sample shall be preserved by the Minister of Inland Revenue for the purpose of comparison with any sample of fertilizer which is obtained in the course of the twelve months then next ensuing from such manufacturer or importer, and which is transmitted to the chief analyst for analysis.

If the fertilizer is put up in packages, every such package intended for sale or distribution within Canada shall have the manufacturer's certificate of analysis placed upon or securely attached to each package by the manufacturer; if the fertilizer is in bags, it shall be distinctly stamped or printed upon each bag; if it is in barrels, it shall be either branded, stamped or printed upon the head of each barrel or distinctly printed upon good paper and securely pasted upon the head of each barrel, or upon a tag securely attached to the head of each barrel; if it is in bulk, the manufacturer's certificate shall be produced and a copy given to each purchaser.

No fertilizer shall be sold or offered or exposed for sale unless a certificate of

analysis and sample of the same shall have been transmitted to the Minister of Inland Revenue and the provisions of the foregoing sub-section have been complied with.

Every person who sells or offers or exposes for sale any fertilizer, in respect of which the provisions of this Act have not been complied with—or who permits a certificate of analysis to be attached to any package, bag or barrel of such fertilizer, or to be produced to the inspector, to accompany the bill of inspection of such inspector, stating that the fertilizer contains a larger percentage of the constituents mentioned in sub-section No. 11 of the Act than is contained therein—or who sells, offers or exposes for sale any fertilizer purporting to have been inspected, and which does not contain the percentage of constituents mentioned in the next preceding section—or who sells or offers or exposes for sale any fertilizer which does not contain the percentage of constituents mentioned in the manufacturer's certificate accompanying the same, shall be liable in each case to a penalty not exceeding fifty dollars for the first offence, and for each subsequent offence to a penalty not exceeding one hundred dollars. Provided always that deficiency of one per centum of the ammonia, or its equivalent of nitrogen, or of the phosphoric acid, claimed to be contained, shall not be considered as evidence of fraudulent intent.

The Act passed in the forty-seventh year of Her Majesty's reign, chaptered thirty-seven and entitled, "An Act to prevent fraud in the manufacture and sale of agricultural fertilizers," is by this Act repealed, except in regard to any offence committed against it or any prosecution or other act commenced and not concluded or completed, and any payment of money due in respect of any provision thereof.

A copy of the Act may be obtained upon application to the Department of Inland Revenue.

E. MIALL,
Commissioner.



Notice to Contractors.

SEALED TENDERS addressed to the undersigned and endorsed "Tender for Four Detached Residences at Experimental Farm, near Ottawa," will be received at this office until MONDAY, 29th August, for the several works required in the erection and completion of the

Four Detached Residences at Experimental Farm, near Ottawa.

Plans and specifications can be seen at the Department of Public Works, Ottawa, on and after Monday, 15th August.

Intending contractors should personally visit the site and make themselves fully cognizant of the work to be done, according to the said plans and specifications, before putting in their tenders.

Persons tendering are further notified that tenders will not be considered unless made on the printed forms supplied, and signed with their actual signatures.

Each tender must be accompanied by an accepted bank cheque made payable to the order of the Honorable the Minister of Public Works, equal to five per cent. of the amount of the tender, which will be forfeited if the party declines to enter into a contract when called upon to do so, or if he fails to complete the work contracted for. If the tender is not accepted the cheque will be returned.

The Department will not be bound to accept the lowest or any tender.

By order, A. GOBEIL,
Secretary.

Department of Public Works,
Ottawa, August 10th, 1887.

6-1

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There are probably very few persons beyond those interested in the trade who know what Apatite is, or to what uses it is applied, and when they are told that the shipments of crude rock in 1886 reached the large amount of 24,876 tons, and that they are annually increasing, they will naturally seek some information respecting it. Apatite is the crystalline form of phosphate of lime, used largely for the manufacture of superphosphates when treated with sulphuric acid. It is only within the last few years that attention has been given to its existence in Canada, although the late Sir William Logan cites its existence in certain localities. Specimens of it, and very pretty they look in a cabinet, might have been seen in museums or in private collections, but the great wealth it would bring to the country was little thought of, and mining it on any large scale would, till quite recently, have been looked upon as a waste of money. To day, however, it is taking its place as one of the foremost industries in Canadian mining, and with the exercise of care and judgment apatite mining affords a handsome return to those who engage in it. This industry, moreover, adds to the general wealth of the country, by the circulation of money in the purchase of agricultural products to feed the miners, for boats and railways transporting it to the seaboard for shipment, to the vessels which carry it across the Atlantic, and to the brokers and commission merchants who handle it before it reaches its British purchasers.

Prof. Boyd Dawkins, an eminent geologist, who, when in America with the British Association, visited the Ottawa County mines, stated, in a paper read by him at Manchester, on his return, that in his opinion phosphate was "one of the most important resources of Canada."

When Liebig, in the year 1840, compelled the agricultural community to accept his views of exhaustion and restoration of the soil, and that the constant removal therefrom in the harvest of the inorganic elements of plant food, notwithstanding the rotation of crops and the old system of manuring, was a robbery of the soil, which enriched the present at the expense of the future, he may be said to have been the founder of an industry which has assumed constantly increasing proportions ever since. That industry is the manufacture of fertilizers or superphosphates, and the demand for materials from which these can be manufactured led to a search for and consequent working of natural deposits in which phosphate of lime preponderated. It is not our intention to

go into the question of fertilizers further than to state *en passant* that in supplying the nutritive elements of plants in the form most favourable for absorption and assimilation, the whole art of manuring consists, and that as ordinary manure does not always contain the two most important inorganic elements of plant food, phosphoric acid and potash sufficient for plant use, the needs of mankind demand the employment of artificial fertilizers along with or as a substitute for farm-yard manure.

Dr. Dawson, the assistant director of the Geological Survey of Canada, in a paper read by him before the Ottawa Field Naturalists' Club, in 1884, reviewed very concisely how phosphorous was essential to all living tissues whether vegetable or animal, and in following the transmission of that substance from the soil to the plant, from the plant to the animal, and from the animal again to the soil, he further pointed out that this cycle of nature is interfered with and broken by the massing of population in large towns where the phosphates and other substances valuable to agriculture are lost. He also cited statistics of the amount of phosphorous actually contained in the grain annually shipped from the port of Montreal, estimating it for this purpose in the form of phosphoric acid. Wheat contains eight-tenths per cent. of this, or about sixteen pounds to the ton, and a very little calculation will show annually the enormous amount carried away, and a still further calculation, based on the average quantity (about two-tenths per cent.) contained in ordinary soils, gives the amount of phosphate of lime required to restore and maintain the fertility of the fields. With these statistics the necessity is evident of having sources of supply of phosphates, the most available of which are concentrated natural deposits. The questions that follow are: what is the nature of them? Where do they occur? How have they been formed?

To the first of these questions let us take Dr. Dawson's own words: "The concentration of phosphates in nature is generally found to have been brought about by organic agency," and he then cites as the first example guanos, composed essentially of the excrements of seabirds. These are divided into two classes, nitrogenous and phosphatic. In the former, which belong exceptionally to dry climates, the organic matter converted by decomposition into ammonia salts, remains as part of the mass, but in the latter the rain has removed the soluble ammonia, leaving the phosphatic matter. This is the case with the West Indian guano, and the coral rock, penetrated with hollows and fissures has become so permeated with phosphatic accumulations that it is known as phosphate rock. The deposits in the South of France, known as Bordeaux phosphates, are looked upon as of a similar origin, the higher parts, the plateaus of Jurassic limestone in which it is found appearing to have formed at one time an archipelago in a tertiary sea, like the West Indian Islands of our own time. This phosphate rock, however, is of very modern origin geologically

speaking. Coprolite beds, such as the phosphate rock of South Carolina, have their origin in a different source, and are traceable to the accumulations in shallow tidal estuaries of ancient seas, of molluscs, bones and other marine organisms massed together by concretionary action, and forming layers similar to the well-known mussel beds on many parts of our sea coasts to-day. But the expression coprolite, applied as it is to Carolina phosphate, is erroneous. It should only be applied to the fossil excrements of various animals, notably the saurian monsters of the antediluvian shores, and which are so abundant in the eastern counties of England that coprolite pits have been worked there for many years. Crystalline phosphate or apatite is new, different in appearance from the preceding, and Dr. Dawson remarks, speaking of it, that in the Laurentian rocks of Canada are sediments deposited in the earliest seas of which we have any trace, but which originally resembling those of later seas, have been so completely altered that their materials have entered into new combinations, and have by igneous action become entirely crystalline, resembling now the original deposits as little as do the crude ingredients of glass the finished product. In substantiation of this theory limestones thus acted on would assume the crystalline character of marble, beds of a peaty or coaly nature would pass into graphite or plumbago (crystalline carbon), and phosphatic layers would appear as crystalline calcic phosphate or apatite. All these substances are found in contiguous zones or belts in the Laurentian rocks near Ottawa, an evidence pointing directly to the correctness of this theory. The greatly disturbed character of these rocks explains the irregularity of their deposits, as layers which, before the great folding and kneading together caused by igneous and volcanic disturbance may have possessed regularity and uniformity have been so dislocated and upset as to lead to the production of large pockets and irregular masses connected only by narrow and twisted seams, so narrow sometimes as to appear as isolated portions.

The principle sources of supply may be stated as follows:—the West Indies and other islands of the Caribbean Sea, supplying what is known to the trade as Sombrero phosphate, or rock guano as it is sometimes called, of high quality; Navassa, from its impurities can only be used for a lower grade of superphosphate; Maracaibo or Mark's Island, is of very high quality; St. Martin's Island, of good quality; Aruba Island yields a variable quality, and Pedro Keys and other small islands yield an uncertain supply. In the Pacific Ocean, Baker, Jarvis, Howland, Malden and Starbuck islands afford a high class rock guano. In the South of France the Ardennes region affords what is known as Bordeaux phosphate, so called from the port from whence it is chiefly shipped. The valley of Lahn, in Nassau, yields what is known as German phosphate. The eastern counties of

England, Cambridgeshire, Bedfordshire and Suffolk produce coprolite of high quality. Boulogne, in France, yields coprolite, used largely for mixing with materials of a higher grade. South Carolina, in the United States, produces large quantities of phosphate known as Charleston rock, of a low grade, but very largely used, its composition being easily attacked by acid.

Crystalline phosphate of lime or apatite, the purest form which is at the manufacturer's disposal, is now becoming more and more sought after owing to its high percentage and greater purity, and Canada will, from present appearances, be the chief source of supply. Norway furnishes an excellent quality of this material, but the supply is limited. Spain produces large quantities of apatite, and in Extremadura and the neighbouring districts of Portugal large deposits have been known to exist for some years, but have only recently been worked to any extent. The above mentioned places are the only known sources whence apatite is obtainable, and as a consequence the great value it assumes from its limited sources of supply must be at once apparent.

In his report on the County of Hastings, in the Province of Ontario, in 1871, Mr. Vennor, late of the Geological Survey staff, called attention to large deposits of apatite existing there that had been quarried on and off for over 20 years. The richest of these occur in the township of North Burgess, where a number of "openings" were worked with fair returns. These deposits he named respectively "the North Burgess Basin," and "Bedford, Storrington and Longboro Basin." Analysis of specimens taken from these in different localities gave as an average 88 per cent. of phosphate of lime. The mineral has now been discovered more or less all through the district lying north of Kingston and Belleville, and although mining is now carried on there on scientific principles, it is as yet in its infancy as far as that part of the country is concerned.

The Laurentian Mountains of the Province of Quebec seem to offer greater advantages than elsewhere for this species of mining, especially in the district lying northeast of Ottawa and within a radius of 30 miles from the capital. This Laurentian range meets the eye when ascending the river St. Lawrence from the sea and runs parallel to it on the north shore, and diverging somewhat east of the confluence of the Ottawa River, follows the course of the latter westward by north sending a spur across it near Portage du Fort, which penetrates the Kingston district alluded to before. The natural formation of these mountains is far from being conducive to agriculture, the country presenting a succession of small isolated, rounded, rocky hills, alternating with numerous lake basins. The rocks, though concealed in the valleys by considerable depths of alluvial soil, are seen in the hills to be hard and undecayed. After the first growth, which covers these hills in a state of nature, has been cut, the undergrowth is apt to be destroyed by fire and the comparatively thin layer of soil is laid bare, which being soon washed away by the rains, exposes the rock and renders the region

sterile. With the exception of straggling settlers here and there in the valleys all this district had been left as valueless till the discovery of the presence of apatite brought it into notice, and land, which was held by the Crown at 30 cents an acre, was bought up by speculators and realized fabulous prices for mining purposes. The latter is carried on principally in the townships of Buckingham, Templeton, Wakefield, Hull, Derry, Portland and Bowman, the two former being the chief fields of present operations. Exploration shows that apatite is to be found in a much wider district than the above mentioned, the zone containing it running in a north-easterly direction from the Blanche River across the River Lievre into the adjoining country east, and then taking a curve backwards in a north-westerly course. The belt is very productive and yields a very fine quality of apatite.

(To be continued.)

Use of the Magnetic Needle in Exploring for Iron Ore.

By Mr. B. H. Brough, Assoc. R.S.M., G.G.S., F.L.C.

(Continued from July number.)

WREDE'S METHOD.

The method proposed by the Baron F. Wrede, in 1874, consists in exploring for two points, one east and the other west of the ore mass, at which the deflections of the needle from the magnetic meridian are equal, but to the west on one side and to the east on the other. The observations are made in the ore field in the direction of the magnetic east and west line, the approximate position of which is assumed to be known. Midway between the two points there must be a third, where there is no declination. The position of the meridian passing over the ore body is thus determined. It is then necessary to determine the magnetic intensity and inclination, in order to calculate where the ore pole is situated. For this purpose it is necessary to find out the position of that point for which the horizontal component of the earth's magnetism is zero, and where the angle of inclination due to the magnetism of the ore bed alone is 90°.

THALÉN'S METHOD.

Professor R. Thalén, of the University of Upsala, employs a modification of Weber's portable magnetometer, or of Lamont's theodolite. He cannot be said to have invented the instrument, since its principle has been known since Gauss' time (1830). Weber's magnetometer dates from 1836, and Lamont's theodolite from 1840. In its simplest form, the instrument consists of a compass box $3\frac{1}{2}$ inches in diameter, divided into degrees or half degrees. At right angles to the diameter, passing through the zero point of the graduation, an arm extends horizontally. This serves as a sight in setting out lines in the field, and receives the bar magnet for the deviation measurements. A deflection of the needle is caused by means of this magnet, the longitudinal direction of which is parallel to the arm, and the distance of which from the needle always remains unaltered. On the other side of the compass box there is a socket, into which a rod of soft iron can be placed perpendicularly for inclination measurements. This iron rod, like the magnet, affects a deflection of the needle. The instrument rotates about a vertical axis, and is provided with a spirit-level and levelling screws. In order to simplify the apparatus still further, the compass box may be fastened to a rectangular board, the edges of which can be used as sights; whilst the board

itself receives the bar magnet, which is fixed by screws or springs into the position that is determined once for all. As support for the instrument, an ordinary surveyor's plane-table may be employed.

The observations with the magnetometer consist for the most part of deviation measurements, for which two different methods may be employed. In one method the instrument is placed so that the needle is directed to the zero point, the bar magnet having been removed from its place. Directly the magnet is replaced the needle will deviate from its original position, the angle of deviation being read from the graduated circle. In the second method the instrument is turned, while the magnet is in its place, until the needle points to zero. The bar magnet is then removed, and, when the needle has come to rest, the angle is read. In this method, under similar conditions, the angle obtained will be greater than in the former method. Of the two methods, the latter, or *sine method*, is the more delicate; but it requires more time than the former, as the instrument has to be re-adjusted at every observation with the magnet and iron rod. This method has the disadvantage of not being applicable in the extreme north of the ore-field, where the magnetism of the ore-bed is powerful. In the former, or *tangent method*, the instrument remains unmoved during both measurements. The disadvantage, however, is that the so-called constants of the instrument vary with the angle of deviation. This does not matter if the results are to be arrived at geometrically, since it is then merely necessary to join the points where the same angle is obtained, quite regardless of the magnitude of the angle and of its corresponding constant. If the position of the ore is to be determined by calculation, the *sine method* must be employed.

Where no ore is present, the needle is acted upon by two forces, one of which is due to the fixed magnet, and the other to the horizontal component of the earth's magnetism. These two forces acting simultaneously, the needle takes up a position in the direction of their resultant. Then if α is the angle of deviation, and H the component of the earth's magnetism, the following formulæ are obtained:

$$\begin{array}{ll} \text{for the tangent method:} & H \tan. \alpha = K_1, \\ \text{for the sine method:} & H \sin. \alpha = K_2, \end{array}$$

in which K_1 and K_2 are constants, so long as the size and position of the magnet remain unaltered. If these constants are known, the actual value of H may be found from the magnitude of the observed angle by either of the methods. If the constants are unknown only the relative value of H may be found. When observations are made near an iron ore field, in both formulæ H must be replaced by R , the resultant of the horizontal component of the earth's magnetism and the magnetism of the deposit. The formulæ then become

$$R \tan. \alpha = K_1, \text{ and } R \sin. \alpha = K_2.$$

When the deviations are caused by the soft iron rod instead of by the magnet, somewhat similar formulæ are obtained; but the magnetism of the iron rod being due to induction, its intensity is proportional to the variations of the vertical components of the earth's magnetism. It follows that the constant K of each formulæ in this case must be replaced by a magnitude that varies with the magnetism of the rod. Observations with the iron rod indicate the inclination of the earth's magnetism; whilst observations with the bar magnet serve for determining the horizontal components of the same terrestrial force. Consequently, by combining the two methods, it is possible to find out the vertical components of the magnetic force.

In order to survey an ore field, it must first be divided into squares with sides 100, 50, or 25 feet in length. Then at every angle of these squares, the deviation must be observed with the magnet and iron rod. Similar observations must be made on ground free from iron, and so far distant from the ore field that the influence of the ore is not felt. It is also advisable to determine the magnetic declination for each point of observation. This may be done by directing the sights along one of the lines that has been set out, and reading the bearing, after the fixed magnet and iron rod have been removed. Observations must also be made along the magnetic meridian north of the supposed ore pole to determine where the north-seeking end of the free needle changes its direction from north to south, or whether it invariably points towards the north.

When these determinations of declination, horizontal intensity, and inclination have been carefully made, and the angles obtained noted on paper divided into squares, lines are drawn for each of the three series of observations, exhibiting equal declination (isogonic lines), equal intensity (isodynamic lines), and equal inclination (isoclinic lines). This is done in each case by joining the points for which equal angles were obtained. The curvature of the lines is drawn as naturally as possible, care being taken to avoid sharp bends. The curves of inclination and intensity thus constructed are closed, and have an approximately circular or elliptical shape, provided that a single isolated ore mass is being dealt with. They are grouped around two points. The one at the north is where the greatest angle of deviation was found, whilst that at the south is where the smallest angle was obtained. Between these two groups of curves is an open curved line representing the neutral angle. In this neutral line the intensity is the same as if no ore was present. The straight line joining the points where the greatest and smallest angles were obtained passes over the centre of the ore mass, and indicates the direction of the magnetic meridian of the ore field. Directly beneath a point in this line, in a vertical ore bed, the greatest mass of ore occurs. The rule that most generally holds good in searching for iron ore is, that the ore mass is to be found immediately beneath the point where the magnetic meridian cuts the neutral line.

The isogonic lines consist of concentric ovals placed, as a rule, symmetrically on both sides of the meridian. From the shape and position of these curves useful indications may be obtained regarding the position of the ore pole, and the shape of the deposit.

TIBERG'S METHOD.

The instruments employed by E. Tiberger consist of a new magnetic instrument for determining the inclination, a plane-table, and a sighting instrument. The inclination instrument consists of a round box $3\frac{1}{2}$ inches in diameter and half an inch deep, fixed in two square brass frames with $3\frac{1}{2}$ inch sides. At its circumference it has a graduated ring, and in the middle a magnetic needle 2.36 inches in length. Its axis is at right angles to the plane of the box, and rests upon two agate supports. The needle can thus move freely when the instrument is placed horizontally or vertically. The instrument differs from other instruments for determining inclination in that the centre of gravity of the magnetic needle is a little below its horizontal axis when the instrument is in a vertical position. The needle is compensated for the vertical force of the earth's magnetism by a piece of wax fastened to its south-seeking end. The instrument is provided with a

spirit-level for horizontal adjustment, and with a ring, by means of which it can be suspended vertically. The sighting instrument is a brass plate about a foot in length, provided at one end with four square flanges to receive the inclination instrument for horizontal measurements. At right angles to this square, there is a groove in the plate with a sliding receptacle for the bar magnet required for horizontal measurements. Four folding sights are attached to the plate in such a way that their lines of sight form a right angle. The instrument, consequently, can be used as a cross-head. Two special sights are added for levelling operations, and the instrument is provided with a circular spirit-level. The plane table employed is of the usual form.

The observations for vertical measurements are made at the surface with the plane-table or by hand. The inclination instrument is fastened to the plane-table, levelled, and turned until the needle points to 90° . The instrument is then raised with the ring at the top, and placed at right angles to the magnetic meridian, and the angle indicated by the needle observed. The same operation has to be done by hand if the plane-table is not available. When the ore appears to be deep, or when the horizontal intensity is powerful, recourse must be had to the plane-table.

The formula for calculating the vertical intensity G is—

$$G = K \tan. v,$$

in which v is the angle given by the needle—that is, its deviation from the horizontal—and K a constant varying in different instruments from 0.75 to 1.4 of the earth's horizontal magnetic force. Lines of equal vertical intensity may thus be constructed. In magnetic plans it is usual to employ a blue colour for positive intensity, and a red colour for negative intensity. The accuracy attainable with this method is from 0.2 to 0.1 per cent. of the earth's magnetic force in central Sweden. With the plane-table 150 to 300 observations may be made per day, and 450 to 500 by hand. For each ore field surveyed the needle must be compensated afresh, and a preliminary magnetic survey made. The field is then divided into squares, with sides 40 feet in length. The base line is as near as possible in the middle of the field, and parallel to the direction of the strike of the deposit. In making the survey observations are made every 10 feet, and in some cases every 5 feet, in the immediate vicinity of the ore, and every 20 to 40 feet or more when further distant from the ore. The general rule is to make as many observations as may be required to indicate what the appearances of the curves will be. Heights are estimated by the eye, or by a preliminary levelling with the sighting instrument, and the more important topographical details are noted.

The maximum of intensity is generally presented by the point where the ore is nearest to the surface. It may also be situated between two adjacent deposits—in which case the intensity decreases, at first slowly, or not at all, and then comparatively rapidly. The distance to the centre of a vertical ore-bed may be taken as at least 0.7 of half the breadth of the north-polar attraction. This rule is, however, not very trustworthy. The vertical distance of the plane of observation from the upper ore pole is equal to the horizontal distance of the point where the needle deviated most from the horizontal from that where $\frac{1}{2}$ of the greatest intensity was found. It is also equal to $1\frac{1}{2}$ of the distance of the point where the needle dipped most from that where half the maximum was found. The latter rule is the best.

Sometimes these calculations enable an opinion to be formed of the relative values of two similar ore beds. For two deposits of a similar character, situated at least 30 feet beneath the surface, it may be assumed that the deposit, for which the product of the greatest intensity and the polar distance is the greater, contains the larger quantity of ore for the same length of deposit. If the polar surfaces of the two beds are limited this product must be replaced by the square of the polar distance.

A good idea of a deposit may be formed from the appearance of the curves of intensity. Regular, long extended, elliptical curves, enclosing a long but narrow district of greatest intensity, always indicate a regular lenticular mass. More circular curves may indicate a segregation of ore if the intensity decreases regularly. Irregular curves indicate more or less irregular deposits.

In exploring for courses of ore in the mine, a base line is marked out in the level, and observations made every 10 feet at least. At each station, three observations have to be made:—1. To determine the direction of the total horizontal intensity by means of the sighting instrument, the deviation of the magnetic needle from the base line being observed. 2. To determine the magnitude of its force by means of the bar magnet. 3. To determine the vertical intensity by means of the inclination instrument. Vertical measurements must also be made at the top and floor of the level, and for this purpose the instrument may be held in the hand. On neutral ground at the surface, the horizontal force of the earth's magnetism and the direction of the earth's magnetic meridian must be determined. The results of all the observations are represented on paper, along the base line, as arrows showing the horizontal forces of the magnetism of the ore at the points of observation. If all or part of the arrows are directed towards the same point, there the ore may be assumed to be. The ore would be at the level at which the observations were made, if the vertical intensity is negative. When the arrows approach in front or behind, the plane of observation is above or below the magnetic centre of the ore. When the vertical intensity is positive, the ore may be above or below the plane of observation, always assuming that a more or less vertical ore mass is being dealt with.

CONCLUSION.

From the sketch of the new methods given above, it will be seen how admirably the principles of terrestrial magnetism have been applied in Sweden for the exploration of iron ores. The results are not only of scientific interest, but also of great practical importance. To illustrate this, it may be mentioned that by applying his method, Tiberger has discovered very important deposits of ore at the mines of Langban and Sikberg. Some interesting results, too, have been obtained by Professor Thalén, who has been able, with the magnetometer, to determine the various percentages of powdered iron ore and microscopic fragments of magnetic minerals occurring in the various beds of clay at Upsala. In the same way the order of succession of beds of iron-bearing can be determined. It appears therefore that accurate magnetic surveys would be of great value to the geologist, as well as to the miner. The value of the improved methods in the exploration and development of iron ore districts cannot be over-estimated, and probably a great future is in store for them in solving questions of stratigraphical geology in districts containing magnetic rocks.

The Bristol Iron Mines.*

Although it is strictly within bounds to speak of the Bristol district as a comparatively new one, it is also a fact that ore has been known to exist in this region for some years. In his "Notes on the Iron Ores of Canada and their Development" (1874) B. J. Harrington, B. A., Ph. D., commented as follows:

"During the winter of 1872-73 several openings were made in deposits of magnetic ore on lots twenty-one and twenty-two of the second range of Bristol, Pontiac County, Quebec. The ore here forms a series of beds, interstratified with reddish syenitic gneiss and glistening micaceous and hornblende schists. The thickness of what appeared to be the most important and the upper-

between E. and W. and E. 30° N., the angle of dip being usually high.

"The ore, though generally called magnetic iron ore, is really a mixture of crystalline magnetic and hematite, with a streak ranging in color from reddish to black. The specimen selected for analysis, and regarded as representing the average of what had been taken from the largest excavation up to July last, was rather finely granular, of a dark steel-grey color, and readily attracted by the magnet. The streak varied from reddish-brown to black in places. Scattered here and there through the mass were nests of pyrites, some of them nearly a quarter of an inch in diameter, and with the glass disseminated grains of quartz and calcite could be seen. The specific gravity was 4.32, and the results of an analysis as follows:

Iron as peroxide.....	45.81
Iron as protoxide.....	11.28
Iron as bisulphide.....	1.28

Total metallic iron.....	58.37
Sulphur.....	1.46

"Combining a sufficient quantity of the peroxide of iron with the protoxide to form magnetic oxide, we find the ore to be a mixture of magnetite and hematite, in the proportion of 46.72 of the former to 33.22 of the latter (1.40 : 1).

"The Bristol mine was first opened in January, 1873, and work continued with eight or nine men until September. The ore raised during that time amounts to about 4,000 tons, and still lies at the mine awaiting shipment. At the time of my visit in July, the largest



most bed could not be ascertained at the time of my visit in July last, as the opening upon it was nearly full of water; judging, however, from the quantity of ore taken out, the thickness must be considerable. Besides this bed, three others have been exposed by stripping; one of them was two feet thick, another only a few inches, but underlain by occasional small lenticular patches of ore, while the fourth appeared to be about nine or ten feet thick, so far as the small amount of work done enabled one to judge. The micaceous and hornblende schists in which the last mentioned bed occurs strike approximately east and west, dipping northward at an angle of only 35°. The general strike of the rocks as observed in the country for several miles east of the mines varies

Peroxide of iron.....	65.44
Protoxide of iron.....	14.50
Bisulphide of iron.....	2.74
Protoxide of manganese.....	0.11
Lime.....	0.60
Alumina.....	3.90
Magnesia.....	0.45
Silica.....	11.45
Carbonic acid.....	1.64
Phosphoric acid.....	traces.
Titanic acid.....	none.
Water.....	6.14
Total.....	100.97

opening which had been made was 35 feet long, 24 feet wide, and about 20 feet deep, and from it about 1,500 tons (estimated) of ore had been extracted."

In 1881 the mine was in the hands of Mr. A. H. Baldwin, who also owned the Forsythe mine. Mr. Baldwin subsequently sold the property to Colonel Roberts, of Charlotte, and it was for some time operated jointly by that gentleman and Capt. C. C. Symonds, an old and experienced Cornwall (England) and Lake Superior mine captain. Colonel Roberts dying, operations were suspended until December, 1886, when the property was acquired by a wealthy and influential syndicate composed of the following gentlemen: Mr. Robert Blackburn, of Ottawa, retired merchant and extensive miner

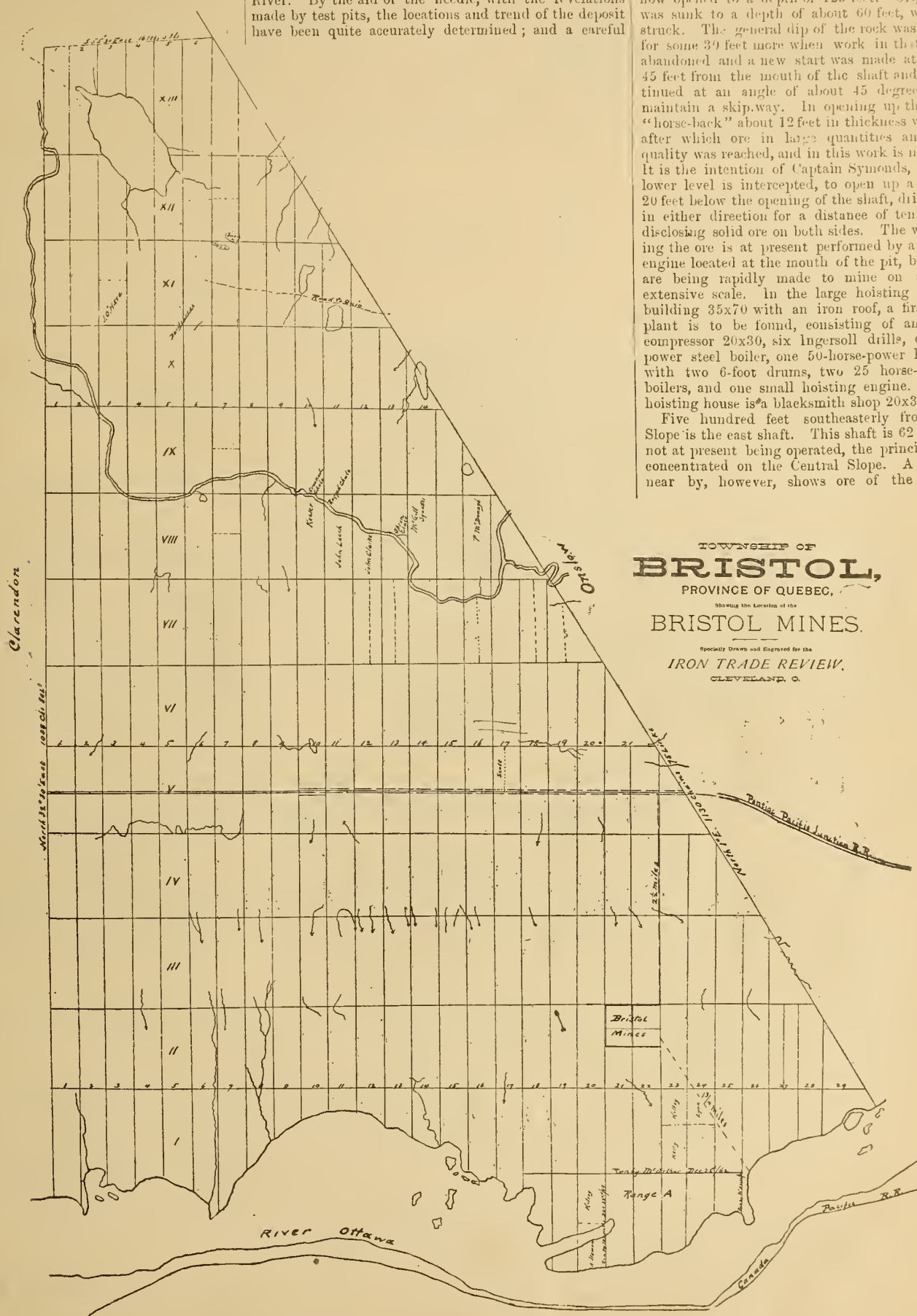
and exporter of phosphates; Mr. Hiram Robinson, of Ottawa, President of the Upper Ottawa Improvement Company and one of the principal owners of the Kingston & Pembroke iron mining properties; Mr. Charles Magee, largely interested in Ottawa real estate and Vice-

property by the writer last week showed the following to be the present stage of development:

The property controlled by the syndicate consists of 400 acres, lying in Bristol Township, Pontiac County, Quebec, one and a half miles northerly from the Ottawa River. By the aid of the needle, with the revelations made by test pits, the locations and trend of the deposit have been quite accurately determined; and a careful

northwesterly and southeasterly. On the north vein is a test-pit 20 feet in depth, from which a considerable quantity of ore has been taken. The most active operations, however, are on the south vein. About the centre of the property is located the "Central Slope," now opened to a depth of 125 feet. Originally a shaft was sunk to a depth of about 60 feet, when rock was struck. The general dip of the rock was then followed for some 30 feet more when work in that direction was abandoned and a new start was made at a point about 45 feet from the mouth of the shaft and the slope continued at an angle of about 45 degrees, in order to maintain a skip-way. In opening up the new slope a "horse-back" about 12 feet in thickness was penetrated, after which ore in large quantities and of excellent quality was reached, and in this work is now proceeding. It is the intention of Captain Symonds, as soon as the lower level is intercepted, to open up a slope. About 20 feet below the opening of the shaft, drifts were driven in either direction for a distance of ten to fifteen feet, disclosing solid ore on both sides. The work of elevating the ore is at present performed by a small hoisting engine located at the mouth of the pit, but preparations are being rapidly made to mine on a much more extensive scale. In the large hoisting house, a frame building 35x70 with an iron roof, a first-class modern plant is to be found, consisting of an Ingersoll air-compressor 20x30, six Ingersoll drills, one 100 horse-power steel boiler, one 50-horse-power hoisting engine with two 6-foot drums, two 25 horse-power portable boilers, and one small hoisting engine. Adjoining the hoisting house is a blacksmith shop 20x30.

Five hundred feet southeasterly from the Central Slope is the east shaft. This shaft is 62 feet deep but is not at present being operated, the principal work being concentrated on the Central Slope. A large stockpile near by, however, shows ore of the same uniform



President of the Bank of Ottawa, and Mr. C. C. Symonds, above referred to.

With characteristic enterprise the syndicate began immediately to resume developments on the property where they were left off by Colonel Roberts. Captain Symonds was put in charge of the active operations, and the work already accomplished speaks volumes for his experience and common-sense. An inspection of the

traversing of the property with the needle tended to confirm the plan laid down by the owners in every respect.

There are, beyond doubt, two veins of iron ore—the north lode showing a width of 150 feet and the south lode a width of about 200 feet. These veins are from 250 to 300 feet apart and have been traced across the entire property of the syndicate. The general trend is

appearance as at the Slope. A short distance west of the Central Slope the vein seems to open out into a secondary seam terminating in a needle tests show that this seam, leaving the south vein, has a width of about 300 feet for a distance of about 110 feet in a southwesterly direction. Lying southeasterly from this vein or off shoot and connected by a narrow vein is the pocket referred to. This pocket is apparently about 350

feet long by 250 feet wide, and two test pits (one of them now being worked as a shaft, under sub-contract) fully confirm the indications of the needle. From the new shaft ore of even better quality than that at the Central Slope is being taken out.

The analysis presented in Mr. Harrington's paper, in 1874, though showing a very good quality of ore, scarcely does justice to the ore more recently taken out, as shown by the following analyses of picked specimens:

[By Dr. S. A. Lattimore, of Rochester (N.Y.) University]

Metallic iron.....	67.80
Silica.....	.02
Sulphur.....	none.
Phosphorus.....	none.
Titanium.....	none.

[By T. W. McKeon, of Youngstown, O.]

Metallic iron.....	66.50
Silica.....	5.50
Phosphorus.....	.0018

[By B. N. R. Richards, of New York.]

Metallic iron.....	62.15
Silica.....	8.12
Phosphorus.....	.0075
Sulphur.....	.97

While the above analyses present a fair idea of the richness of the ore, and while considerable quantities are to be obtained with little or no sulphur, the fact is to be stated, and is acknowledged at the outset, that the great bulk of the product is too high in sulphur for successful use in the blast furnace before being calcined or roasted. A fair statement of the average percentage of sulphur would probably place it at from 1.5 to 2 per cent. The problem before the syndicate has been from the beginning, whether to roast the ores at the mines or at the furnace. They have finally decided upon the former course, for the present, and have now on the grounds the castings and fire-brick for two calcining furnaces after the patterns of Taylor & Langdon, of Chester, N.J.

The Taylor-Langdon furnace consists essentially of a series of ore chambers surrounding a central gas distributing chamber and arranged to receive their supply of ore from a common ore chamber at the top of the furnace. The ore chambers are provided at the bottom with shutters and gates for regulating the drawing of the ore. In practice, the ore has to be broken to the size of a man's fist. Gas fuel is used, and the admission of gas is controlled by dampers, so as to maintain at the circulating flue—where it meets the air for its combustion—and oxidizing atmosphere as far as possible. Since the elimination of sulphur is imperfect, even at a high temperature, while the ore is in contact with gaseous products of combustion, the ore is withdrawn from such contact as soon as possible after it has attained the necessary temperature. The construction of the kiln is such that the workman can control the process by having access to the ore during the whole time it remains in the kiln, especially in the hot zone. By this furnace the sulphur has been reduced to 0.10 per cent. but it usually runs 0.30 to 0.40 per cent. The New Jersey magnetites, which are principally roasted in the Taylor-Langdon furnace, are very hard and dense, carrying from 2 to 5 per cent. of sulphur as pyrites, and become very sticky as soon as any attempt is made to roast them at a high heat. The Bristol mine ores, on the other hand, are of a rather soft and friable texture, easily freed from sulphur, yet not disintegrating under heat. This peculiarity has been demonstrated in the kiln, and was also shown in the heating of a piece of ore in the blacksmith's forge on the ground last week. The cost of Anthracite (buckwheat size) at the mine is \$5 per ton. Six tons of coal will calcine 100 tons of ore, and the product of each kiln is about 50 tons per day. This kiln is now in operation at Chester furnace, Chester, Pa.; Edge Hill furnace, Edge Hill, Pa.; Phoenix Iron Works, Phoenixville, Pa., and elsewhere, and is doing good work. The Bristol mine syndicate is confident that the cost of roasting can be brought under 55 cents per ton. It is worth while considering, however, whether it might not be economy to transport the raw ore to a natural gas region, or to a cheap fuel center like Cleveland, and there roast them before consumption.

An examination of the two maps accompanying this article will show that, with comparatively little trouble or expense, the district can be brought into direct connection with the great consuming centres of New York, Pennsylvania and Ohio. To the north, a distance of only 2½ miles, runs the Pontiac Pacific Railroad connecting with the Canadian Pacific and running into Ottawa, thence direct to Prescott or Brockville, on the St. Lawrence River. It is understood that the Pontiac Pacific is willing to run a switch to the mines upon certain conditions as to shipment. Another valuable connection would be by the Canadian Pacific direct, which could be reached by a tramway running southwesterly 1½ miles, thence across the Ottawa River by ferry to Braeside, on the Canadian Pacific, reaching the St. Lawrence at Brockville. At either of the above points on the St. Lawrence, barges and schooners can be loaded direct for

Cleveland and Lake Erie ports. Crossing the St. Lawrence rail connection can be had to New York and Eastern Pennsylvania furnaces. The distance to market are as follows: From the mines to Billerica, on the Pontiac Pacific Railway, 2½ miles; from Billerica to Ottawa, 40 miles; from Ottawa to Prescott, 51 miles; from Prescott to Cleveland, 412 miles; total, 535½ miles. The route by Braeside and the Canadian Pacific Railway is about the same. The distance of the Gogebic mines from Cleveland is 858 miles (60 miles rail, 798 miles lake). The Vermillion mines are slightly further, while Marquette and Menominee are nearer.

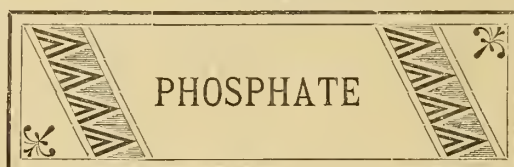
From data based on actual experience, as well as from propositions now in the hands of the syndicate, we make the following estimate as to the cost of mining and marketing the ore:

	Per Ton.
Cost of mining.....	\$.50
Roasting.....	.55
Handling at the mine.....	.15
Rail freight to the St. Lawrence.....	1.00
Loading.....	.25
Lake freight to Cleveland (including unloading).....	.90
Duty.....	.75
Agent's commission, insurance, interest, etc.....	.15
Total.....	\$4.25

Ore of this grade, free from sulphur, is now selling in Cleveland at \$6 @ \$6.50. With increased handling facilities at mine and river, the cost would be reduced to but slightly over \$4.00 per ton.

The gentlemen comprising the syndicate have embarked in the enterprise not as a speculation, but solely on business principles, and they propose to develop the property to its fullest extent. The mine is not for sale, but its product will be by next season. It is within the scope of the syndicate's plans to smelt the ore at the mines, but this is a matter for future consideration. The new Canadian tariff doubles the previous rate on pig iron, placing it now at \$2 per ton, and affords ample protection. The present consumption in Canada is equivalent to 250,000 tons of pig iron, leaving steel rails out of the question altogether; so that, under the new tariff, an immediate and steady home market is assured. With a continuance of the same intelligent and progressive management as in the past, there is no reason to doubt that the new district will soon take a most important rank among the iron producing districts of the Dominion.

*Reproduced with alteration and slight correction from an article published by the *Iron Trade Review*, Cleveland, Ohio. We are also indebted to the management of that excellent journal for the use of the plates.—Editor.



The following shipments of Canadian ore have been made from Montreal for month ending 31st July, 1887:—

Date.	Shippers.	Ship.	Destination.	Tons.
July 5	Wilson & Green..	s.s. Henry IV..	London....	199
" 6	Lomer, Rohr & Co.	s.s. Carropus ..	Liverpool..	335
" 13	" ..	s.s. Westum-berland ..	London ..	162
" 19	" ..	s.s. Dacona....	do	185
" 19	Gillespie Paterson	do	do	116
" 21	Lomer, Rohr & Co.	Bar. Jeda	Montrose..	50
" 22	" ..	s.s. Auesley... ..	London....	336
" 21	" ..	Bar. Beltrees ..	Fleetwood..	100
" 28	" ..	s.s. Cremorn ..	Hamburg..	220
" 29	Wilson & Green..	s.s. City of Lincoln	London....	398
			Total....	2,191

A new company under designation of the United States and Canada Phosphate Mining and Fertilizing Company has been organized at Hallowell, Me., with a capital stock of \$200,000. Two hundred acres of mining lands have been purchased near Buckingham, and the new company proceed at once to mine phosphate and manufacture fertilizers.

A scheme is stated to be on foot in Montreal to open a new field for the utilization of phosphate. One of the proposals is to obtain possession of the Montreal abattoirs with a view to mixing dried roek with the tannage and thus produce at once a very powerful manure.

Advices from the Canadian phosphate mines continue satisfactory, the output continuing fully up to expecta-

tious. Prices in England and on the Continent range pretty much as previously, while the outlook for sales of Canadian crude phosphate in the United States market continues to improve.

The two lots which the Union Phosphate & Land Co. have lately opened up on Silver Lake give every indication of turning out well. A steam drill, hoisting engine and other improved machinery, along with a force of about twenty men, are employed. The Star Hill Mine is turning out its usual monthly output.

The output from the High Rock Mine for the past month will figure about 625 tons high grade ore. Most of this has been taken out of pit 2, which is undoubtedly one of the finest pits at present operated in Canada.

Mr. Wm. Pickford, sr., one of the owners of the mine, who has been residing on the property for several months, has returned to England.

Major Turnbull and Mr. Thomas Trimble, of Montreal, who are largely interested in the Templeton and Blanche River Phosphate Mining Company, paid a visit during the month to their newly acquired property at Templeton. They express themselves as much pleased with the outlook of the company.

The North Star Company have purchased a new 40 horse-power boiler which will greatly facilitate the further sinking of their shaft which has now reached a depth of 620 feet.

Mr. Franchot, manager of the Emerald Mine, informs us that the usual output of 500 tons was reached last month with a staff of about sixty men.

The mills of the Du Lievre Milling & Mining Company, at Bassin Du Lievre, are kept very busy grinding large quantities of lower grade ore from the various mines. We understand that the company are receiving large quantities from the Perth district.

Much dissatisfaction exists among the miners and business men with regard to the passenger service lately adopted by the Canadian Pacific Railway between Montreal and Ottawa. By the new arrangement visitors to the Capital from Buckingham must lose two nights and a day before they can return, while formerly they could transact their business and reach home on the same day. We understand that an endeavour will be made to effect a more convenient train service between the two points.

Operations are being conducted smoothly at the Little Rapids Mine. The energies of the staff have been directed to the ballasting and fixing up of the new tram line and other improvements on the property. Bush fires in the neighbourhood have proved troublesome, and numbers of men have been constantly employed for several days cutting down timber and taking other steps to remove the buildings on the property from danger. In consequence of these the output for the month has been somewhat below the average.

On Thursday, 11th instant, a representative of the REVIEW paid a visit to the Buckingham district with the object of visiting all the mines now in operation on the Lievre. Little Rapids was the first property visited, and here, through the courtesy of the superintendent, Mr. George R. Smith, we were taken down the shaft, which has now attained a depth of some 212 feet. A close inspection of the various levels revealed an immense body of high grade ore. We were next conducted to the engine and pump houses, where nothing but the newest and most improved machinery is being operated; the stores, cobbing houses, and the other buildings on the property were also visited. Everywhere one could not fail to be impressed with the careful, systematic and orderly manner which characterises the working of this mine.

It was our intention, on returning from the other mines further up the river, to have made a longer and closer inspection of this property, but as the sequel shows this was not to be.

In company with Mr. James White, of the Geological Survey, who has been located in the district during the summer making a topographical survey of the phosphate region, and Mr. A. May, of Ottawa, who had accompanied us on our visit, we started on our return to the Landing. Near by stood one of the ordinary box trucks used for carrying the ore over the new tram line, and to facilitate our progress, for the road was soft and slippery, we mounted this car, which, by the way was loaded with

rock, and started her down the hill. Mr. White was operating the brakes in front and the REVIEW man and Mr. May were standing on the small platform in rear. At first all went well, but on reaching the first grade the brakes, through some unexplained reason, failed to hold, and gaining impetus at every yard the car shot down the hill with terrific speed. With a roar like thunder we swept round curves and down grades in the most appalling manner, until about half way down the hill, fortunately on one of the best pieces of track, the car left the rails, and after running several yards along the ties crashed over on its side. The occupants were all thrown violently to the ground. Mr. White, upon whose foot the car fell, sustained a severe fracture to his right leg, was cut about the face and badly shaken. The REVIEW man was more fortunate, escaping with a simple fracture to the left arm and a little shaking up. Mr. May was uninjured. The wonder is that all three were not dashed to pieces. Intelligence of the accident was at once conveyed to Buckingham and five hours later Dr. Wallace arrived and had the injured promptly attended to. The thanks of the party are due to Mrs. Platt, who was unremitting in her kindly attention to the injured, and to the sympathetic band of stalwart miners who worked so hard for their comfort. No blame can be attached to anyone for the unfortunate occurrence.

The Du Lièvre is rapidly falling but no actual work has been accomplished on the new lock and dam at Little Rapids. The contractor has pitched his tents on the ground, built himself a "bathing house," and brought up some material; but the powers that be have set a "nigger on the fence" to show how such things are done, and NOT done.

On Wednesday 10th inst., a special meeting of the Ottawa County Council was held for the purpose of settling the dispute which has long existed between the West Templeton Township and the Canada Phosphate Company, relative to the payment of taxes on a proposed new road running through lots 16, 17 and 18, range 8, and which the company affirmed they would never use and could not legally be taxed for. On the other side it was argued that the township could not make a new road on the concession line, as a hill of sand would have to be excavated at an enormous outlay. The phosphate company own lots 16, 17 and 18, range 9, and as the township affirm should pay a proportionate part of the taxation. The question was debated for some four hours before the ayes and nays were called for, which, when taken, resulted in a tie. Mr. Cormier, as Warden, gave his casting vote in favour of the company.

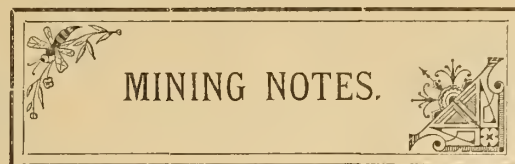
The phosphate and other deposits discovered by Mr. John Frost in the rear of the Township of Litchfield, specimens of which he had examined by Mr. Obalski, the mineralogist, have been pronounced the best shewn him in Pontiac.

Mr. Alex. Johnston, who has purchased a half interest in the O'Brien Phosphate Mine, put in three blasts recently with the result that the mineral turned out better than was expected. He contemplates putting on a force of men this fall when the extent of the development will be ascertained.

Mr. Sharp has discovered phosphate on his farm in Bristol, specimens of which has been left at the office of the Crown Land Agent for examination by the mineralogist.

The simultaneous manufacture of these two valuable fertilizing products, assimilable phosphates and sulphate of ammonia, has been facilitated by a process lately patented by Mr. E. Salvoy, of ammonia-soda renown. It consists in adding to superphosphate of lime, during its manufacture, ammonia and carbonate of ammonia, so as to produce a complete manure in which the nitrogen is fixed without any additional acid. When phosphate of lime is attacked by sulphuric acid, almost insoluble sulphate and soluble monobasic phosphate of lime are produced, and this mixture constitutes the usual superphosphate of commerce. These two salts may be separated by filtration, or they may be left intermixed. By the new process, a very large portion of the acid employed for this purpose may be economized or recovered by combining this manufacture with that of ammoniacal salts, for, if ammonia be placed in presence of monobasic phosphate of lime, an insoluble bi-basic phosphate of lime and phosphate of ammonia are formed. The phosphate of lime obtained has an agricultural value equal to that of superphosphate, and in addition, phosphate of ammonia is obtained, which is very valuable for agricultural purposes. If it be preferred to obtain all the phosphoric acid as phosphate of ammonia, the phosphate of lime (bi-basic) is treated over again by

sulphuric acid. If it be preferred to obtain all the phosphoric acid in a state of phosphate of lime, the phosphate of ammonia is treated by a suitable salt of lime.



Nova Scotia.

A gold mine, known as the Hall Owens property at Caledonia, N.S., was recently sold to an American Company for \$25,000.

The Eastern Development Company (Limited) has received a diploma and bronze medal for its exhibits at the Colonial and Indian Exhibition held lately in England.

There is, says the *Critic*, very little new to report in regard to the gold mines of the Province. All the old properties are being worked to their utmost capacity, but new finds of value are rarely heard of. Coal mining is in a flourishing condition, and the Spring Hill Mines have just closed a large contract with the Grand Trunk Railroad. Nothing new has been received in regard to the opening up of the iron deposits under the stimulus of the new tariff; but the air is full of rumors of proposed works. We should like to see active operations commenced, as the summer season is now half over; and if something is not soon done, another year will have to elapse before smelting works can be built. In New Brunswick, the mining outlook is most promising, and new discoveries of valuable minerals are reported from several sections of the Province. The wild speculative period of mining has been passed over, and under wise and competent management, assisted by greatly improved mining machinery, profitable returns are the rule, and we hear of no failures.

The mines on Gold River are being worked as usual, but the water supply for crushing is short at this dry time. Quartz, however, of a good quality is being taken out, and will be all ready for the first rain, when we hope to hear of that mill taking lots of the precious metal from the quartz now being raised to the surface.

Quebec.

There is nothing new to report from the Villeneuve Mica & Mining Company's mines. The work of cutting and sorting the mica is being steadily pursued and the management at Buckingham is kept very busy filling large orders from Canadian and American consumers.

Ontario.

Our Sudbary correspondent sends us the following particulars of recent operations at the mines of the Canadian Copper Company:—At the Copper Cliff Mine there have been put in two 50 horse-power boilers, made by John Doty Engine Co., Toronto, which furnish steam for a small double hoisting engine, built by Webster, Camp & Lane Manufacturing Company, of Akron, Ohio, and one three drill air compressor, made by Ingersoll Rock Drill Company, of Montreal. A ten horse-power portable engine drives a Beckett & McDonald rock breaker, which has a capacity of crushing eighty to one hundred tons of ore per day. After passing through the crusher the ore and waste rock are separated. A two compartment shaft, with shaft house and rock house, are being built, the former nearly completed. At the Stobie Mine the earth and detached waste rock are being stripped from the surface, thus exposing the ore. A vertical shaft is being sunk to strike the vein at about 450 feet from the base of the hill, which has now reached a depth of 72 feet. At this mine a three drill compressor and one crusher are in operation, together with a small hoisting engine at the shaft. The company have secured the services of Dr. George Stewart, a late graduate of the Toronto School of Medicine, as physician and surgeon for the miners and their families. On Tuesday, the 2nd instant, the Hon. Alex. McKay, Mayor of Hamilton, Ont., with a party of about twenty aldermen of that thriving city, made a brief visit to the Stobie Mine.

The Nipissing Times will shortly contain a series of articles on Mineralogy and Prospecting from the pen of a distinguished mineralogist. The object in view is to enable its readers to discover for themselves the various economic minerals which are said to exist in abundance in the Mattawa district.

Local exchanges announce the discovery of anthracite coal on the property of Mr. Nix, a farmer, living about nine miles east of Campbellford. Samples were found by Mr. Nix some years ago, but he paid no attention to the matter until Dr. McCrea, of Campbellford, interested himself in the case.

We understand that the Kaladar gold mining property, owned by Napanee parties, has been sold for \$12,000. Mr. Peter McLaren, of Perth, is one of the purchasers.

Mr. N. J. Ritchie, president of the Central Ontario Railway, will shortly commence work at the Baker iron mine.

PORT ARTHUR DISTRICT.

The *Miner* has been incorporated with the *Weekly Herald*. The paper will hereafter be known as *The Algoma Miner and the Weekly Herald*.

The Rabbit Mountain Mine is still under course of development, under the management of Dr. Lehman, of St. Paul. It is only fair to say that had the company, which own this property, adopted the vigorous policy pursued by their neighbours at the Beaver Mine, they would to-day have probably as much ore in sight. Under Dr. Lehman the shaft at this mine has been deepened 100 feet, which gives a total depth of 240 feet. For the last 70 feet of this distance a fine streak of silver shown continuously along the foot wall of the shaft. Drifts from the shaft in both directions are being driven at the bottom, and at fifty feet above it, with most encouraging results.

Silver Mountain, east end, is looking particularly well at the present time. The west, No. 3, shaft has been sunk 125 feet and good silver struck. This is the shaft to sink which new machinery has been put down and recently got in operation, and they are now prepared with all the appliances to go down 1,000 feet. In this shaft the pay streak is 3 feet wide and assays show \$90 of silver per ton. In stope drift No. 5 the pit is showing up good about 30 feet down, and this, with the large amount of undeveloped ground to the west toward the new shaft, leads to the conviction that there is plenty of good ore to be had in Silver Mountain, east end. They are just now shipping in sacks the smelting ore to Liverpool. Capt. John Trethewey has resigned his position as superintendent of the mine and Capt. Thomas Trethewey takes his place, the change having gone into effect on the 1st instant.

The Ontario Silver Mining Company, of St. Paul, are working a short distance east of the Badger, and according to reports, are delighted with their investment.

The presence of R. G. Peters, of Manistee, Mich., in the city, and the knowledge that he is chief owner in the wonderfully rich Beaver Silver Mining properties, but lately developed, sent a News representative after him to glean, if possible, a few facts regarding his exceedingly profitable investment. It was learned that there are now 144 men employed at the mine, which is 28 miles southwest of Port Arthur on the Canadian North Shore of Lake Superior. The mine owners are now shipping away about \$10,000 worth of ore daily, none of which has a lower assay value than \$1,500 per ton, and much of it a great deal higher. Mr. Peters has with him a little fragment of native silver weighing 60 pounds, which has an assay rating of \$15,000 per ton. The property is being rapidly developed, and 350 feet of shafts have already been made, and 2,300 feet of cross drifting has taken place, with the result in every instance of increasing the visible amount of rich ore in sight. The gentlemen who own the mine are increasing the machinery and appliances for reducing the ore more rapidly, less expensively and with far less waste than heretofore.—*Duluth News*.

The prospect at the Queen Gold and Silver Mining Company's location is good, and all the developments only give more certain evidences of the value of the location. Mr. Kimball has made a big cut 20x20 feet on the junction of the two veins and here he intends to sink the shaft. From the shaft they will be able to drift four ways.

In the immediate neighbourhood of Port Arthur are vast deposits of silver and gold now being worked, and towards the frontier line is an extensive region of iron ore. The Port Arthur, Duluth and Western Railway will accommodate a number of these mines, and, passing through the iron regions, will connect with the Duluth and Iron Range Railway, forming a direct route to Duluth, St. Paul, Minneapolis, and the Northern

Pacific Railway. Within three miles of Port Arthur is Fort William, on the Kaministiquia River, navigable for ten miles, on which the Canadian Pacific Railway has extensive dockage and warehouse property. Port Arthur, with its piers, where the lake steamers arrive and depart with passengers and goods, and Fort William, where the freight traffic is transacted, have but a narrow mile or two between, and must be linked together as one city—the Port Arthur of the future.

British Columbia.

The Silkirk Mining and Smelting Company, of Illecillewaet, shipped their first car load of ore on the 25th ult., to the smelting works at Denver. The shipment consisted of fifteen and a half tons of tested ore, having an assay value of 2,120 ounces of silver. The company have the privilege of drawing on the smelting works for ninety per cent. of this value on its being forwarded. An assayer holding the confidence of the Denver company states the value of the ore, he having made tests that enable him to do so. On the lead nothing can be drawn until it has been smelted. The work on the four ledges owned by this company is progressing favourably, and it is hoped that in course of a short time they will be in a position to turn out ore at the rate of two or three carloads per week.

Hixon creek is still being developed, the company confining their efforts to sinking on the shaft which is constantly improving in quality of rock.

The Rock creek gold fields on the border are getting more prominent every day for the extent and richness of its mineral. The Amelia is one of the seventy-five or more locations about five miles from Rock creek on elevated table land. Two shafts are being sunk, one of them is down forty feet and shows a fine body of ore. A thirty foot cross-cut has been made on the other fifteen foot shaft and no foot wall is found. The surface cropings are rich with free gold and as it is penetrated it becomes rich in sulphurets.

Mr. John Ross, the well known railway contractor, has become the owner of a silver mine on Illecillewaet river, which promises to be very rich, judging from the assays that have been made from its ores. Mr. Ross has purchased two of the most improved crushers, and these will be taken out shortly and placed in position. The mine is distant about one mile from the railway track and is located away up on the steep mountain.

Mr. John B. Farish, of Denver, Colorado, a mining engineer who ranks among the first in America, has been retained by the British Columbia Milling and Mining Co. and the Island Mining Co. to examine their mining properties in Cariboo. It shows wisdom on the part of the above companies to retain a mining engineer of known ability, instead of trusting to one whose only recommendation may be cheapness. The B. C. and Island Mountain will thus secure positive information as to the proper treatment of their properties and though it is rather expensive at present, it is bound to prove the most economical in the end.

The Vancouver Coal Mining and Land Company's mine was discovered in the early days by the employes of the Hudson Bay company, and has been operated since 1851. Its coal has been used by the San Francisco Gas company for the past thirty years—a striking testimony to its merits. There are always several hundred men employed at the mine, which is one of the largest on the Pacific coast, and produces some of the best coal in the world.

The total area of the Wellington Estate, operated by the Vancouver Coal Company, comprises 2,417 acres. Messrs. R. Dunsomier & Sons have constructed a railroad a little over four miles in length, the greatest grade of which is 1 in 30, and the greatest curve 33; this bringing the mines to the water's margin. The daily output averages about 800 tons, 17,000 tons per month being shipped to San Francisco, San Pedro and other ports along the coast.

For domestic use the Wellington coal has been held in high favour from the earliest period of its introduction, for the reason that the most careful analysis has thus far failed to discover in it the slightest trace of sulphur, consequently it contains neither gas nor coke. For steam vessels and industrial purposes it is especially fitted, and to that use it is largely supplied. For more than eighteen years these mines have been operated upon a scale commensurate with the demand for the character of coal produced by them, supplying a rapidly growing trade from Vancouver Island to Mexico; and stretching far out into the Pacific Ocean to Hawaii, and yet the door of these coal fields is but fairly open.

Alaska.

Considerable excitement prevails in mining circles over the reported rich discoveries in the Silver Bay district near Sitka. The Lake Mountain Mill company has struck the ledge on the Lucky Chance location by continuing the same tunnel run under the management of B. R. Crowles. A quartz mill will soon be put in operation.

Mining developments and rich strikes from the Berner Bay district are constantly being reported.

The United States steamer Pinta has returned from Chilcoot to Sitka and reports everything quiet in that vicinity; also that the miners in the Yukon country are doing well so far as heard from.

NOTICE TO SUBSCRIBERS.

Readers of the REVIEW who may be residing out of town during the summer months can have their copy mailed to their new address on communicating with the office.

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TOWNSHIP OF ASCOT.

- 1st. Clark Mine, Lot 11, R. 7 Ascot 187 acres
- 2nd. Sherbrooke Mine, part Lots 12 and 13,
R. 7 Township of Ascot 329 "
- 3rd. Belvidere Mine, part Lots 9 and 10, R.
9 and 10, R. 8 Ascot 292 "
- 4th. Mining Rights in same vicinity on 250 "

All of the above properties lie within $1\frac{1}{2}$ miles of the Village of Lennoxville, at the junction of the Grand Trunk, Canadian Pacific and Passumpsic Railways, and have been developed to a considerable extent, and veins opened 6 to 20 feet in width, yielding 3 to 5 per cent. of copper, also silver, and 35 to 40 per cent. of sulphur. These mines are only $2\frac{1}{2}$ to 3 miles distant from the City of Sherbrooke, and evidently are of the same class of ores found at Copelton, only four miles distant, owned and worked by the Orford Copper and Sulphur Company, and by Messrs. G. H. Nichols & Co., of New York, which have proved so remunerative.

TOWNSHIP OF ORFORD.

- 5th. Carbuncle Hill Mine, Lots 2 and 3 R. 14, and
2, 3, 4 R. 15, 718 acres. Same class of ore as is found
in the Ascot properties above described, but yielding a
higher percentage of copper.

TOWNSHIP OF CLEVELAND.

- 6th. St. Francis Mine, $\frac{1}{4}$ Lot 25 R. 12, 50 acres, with
dwelling houses, smith's shop, ore sheds and office, large
winding and pumping steam engine, with boiler, winding
and pumping gear, and about forty fathoms Cornish lift-
ing pumps complete, railway tracks, ladders, etc., situated
three miles from Grand Trunk Railway. A considerable
amount of mining work has been done at this mine.
A well defined vein richly charged with vitreous purple
and yellow sulphurets of copper traverse the entire
length of the property, five feet in thickness, yielding 8
to 40 per cent. metallic copper.

TOWNSHIP OF GARTHBY.

- 7th. Fifty-six lots of land, 2,938 acres. This prop-
erty for the most part is unexplored, but copper is found
on the greater part of the property. On one of the lots
a vein about twenty feet in width has been found.
Samples of the ore have yielded as much as 22 per cent.
of copper, being also rich in sulphur. Other samples of
pyrites from the same property, free from copper, have
yielded as high as 48 per cent. of sulphur. The only
drawback to this property is in its distance from the
railway, it being about four miles from Garthby Station,
Quebec Central Railway. A new line is chartered,
however, which, when built, will run directly through
the property.

TOWNSHIP OF ACTON.

- 8th. The Acton Mine, 100 acres, with engine, boiler,
pumps and appliances. Within three years after this
mine was first opened it produced nearly \$500,000
worth of copper. It is situated about half a mile distant
from the stations of the Grand Trunk and South Eastern
Railways.

- 9th. Brome Mine, part Lots 2 and 3 R. 4, 50 acres.
- 10th. Bolton Mine, two miles from Eastman Station,
Waterloo & Magog Railway, 400 acres.

The above properties formerly belonged to the Canadian Copper and Sulphur Company, and were acquired by the present owner at sheriff's sale, giving an indisputable title thereto.

The whole or any portion of the property will be sold at reasonable prices.

For further information apply to

WM. FARWELL,

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CANADA.



Mining Regulations

TO GOVERN THE DISPOSAL OF

Mineral Lands other than Coal Lands, 1886.

THESE REGULATIONS shall be applicable to all Dominion Lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, iron or other mineral deposits of economic value, with the exception of coal.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein, either by surface or subterranean prospecting for mineral deposits, with a view to obtaining under the Regulations a mining location for the same, but no mining location or mining claim shall be granted until the discovery of the vein, lode or deposit of mineral or metal within the limits of the location or claim.

QUARTZ MINING.

A location for mining, except for iron on veins, lodes or ledges of quartz or other rock in place, shall not exceed forty acres in area. Its length shall not be more than three times its breadth, and its surface boundary shall be four straight lines, the opposite sides of which shall be parallel, except where prior locations would prevent, in which case it may be of such a shape as may be approved of by the Superintendent of Mining.

Any person having discovered a mineral deposit may obtain a mining location therefor, in the manner set forth in the Regulations which provides for the character of the survey and the marks necessary to designate the location on the ground.

When the location has been marked conformably to the requirements of the Regulations, the claimant shall, within sixty days thereafter, file with the local agent in the Dominion Land Office for the district in which the location is situated, a declaration or oath setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as aforesaid; and shall, along with such declaration, pay to the said agent an entry fee of FIVE DOLLARS. The agent's receipt for such fee will be the claimant's authority to enter into possession of the location applied for.

At any time before the expiration of FIVE years from the date of his obtaining the agent's receipt, it shall be open to the claimant to purchase the location on filing with the local agent proof that he has expended not less than FIVE HUNDRED DOLLARS in actual mining operations on the same; but the claimant is required, before the expiration of each of the five years, to prove that he has performed not less than ONE HUNDRED DOLLARS' worth of labor during the year in the actual development of his claim, and at the same time obtain a renewal of his location receipt, for which he is required to pay a fee of FIVE DOLLARS.

The price to be paid for a mining location shall be at the rate of FIVE DOLLARS PER ACRE, cash, and the sum of FIFTY DOLLARS extra for the survey of the same.

No more than one mining location shall be granted to any individual claimant upon the same lode or vein.

IRON.

The Minister of the Interior may grant a location for the mining of iron, not exceeding 160 acres in area which shall be bounded by north and south and east and west lines astronomically, and its breadth shall equal its length. Provided that should any person making an application purporting to be for the purpose of

mining iron thus obtain, whether in good faith or fraudulently, possession of a valuable mineral deposit other than iron, his right in such deposit shall be restricted to the area prescribed by the Regulations for other minerals, and the rest of the location shall revert to the Crown for such disposition as the Minister may direct.

The regulations also provide for the manner in which land may be acquired for milling purposes, reduction works or other works incidental to mining operations.

Locations taken up prior to this date may, until the 1st of August, 1886, be re-marked and re-entered in conformity with the Regulations without payment of new fees, in cases where no existing interests would thereby be prejudicially affected.

PLACER MINING.

The Regulations laid down in respect to quartz mining shall be applicable to placer mining as far as they relate to entries, entry fees, assignments, marking of localities, agents' receipts, and generally where they can be applied.

The nature and size of placer mining claims are provided for in the Regulations, including bar, dry, bench, creek or hill diggings, and the RIGHTS AND DUTIES OF MINERS are fully set forth.

The Regulations apply also to

BED-ROCK FLUMES, DRAINAGE OF MINES AND DITCHES.

The GENERAL PROVISIONS of the Regulations include the interpretation of expressions used therein; how disputes shall be heard and adjudicated upon; under what circumstances miners shall be entitled to absent themselves from their locations or diggings, etc., etc.

THE SCHEDULE OF MINING REGULATIONS

Contains the forms to be observed in the drawing up of all documents such as:—

"Application and affidavit of discoverer of quartz mine." "Receipt for fee paid by applicant for mining location." "Receipt for fee on extension of time for purchase of a mining location." "Patent of a mining location." "Certificate of the assignment of a mining location." "Application for grant for placer mining and affidavit of applicant." "Grant for placer mining." "Certificate of the assignment of a placer mining claim." "Grant to a bed rock flume company." "Grant for drainage." "Grant of right to divert water and construct ditches."

Since the publication, in 1884, of the Mining Regulations to govern the disposal of Dominion Mineral Lands the same have been carefully and thoroughly revised with a view to ensure ample protection to the public interests, and at the same time to encourage the prospector and miner in order that the mineral resources may be made valuable by development.

COPIES OF THE REGULATIONS MAY BE OBTAINED UPON APPLICATION TO THE DEPARTMENT OF THE INTERIOR

A. M. BURGESS,

Deputy Minister of the Interior.

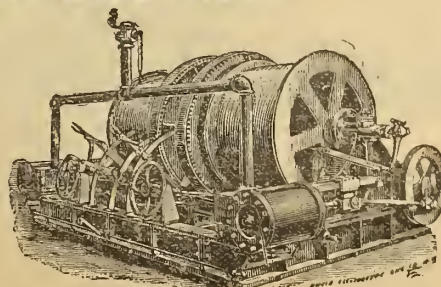
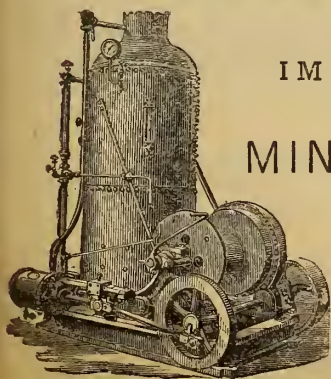
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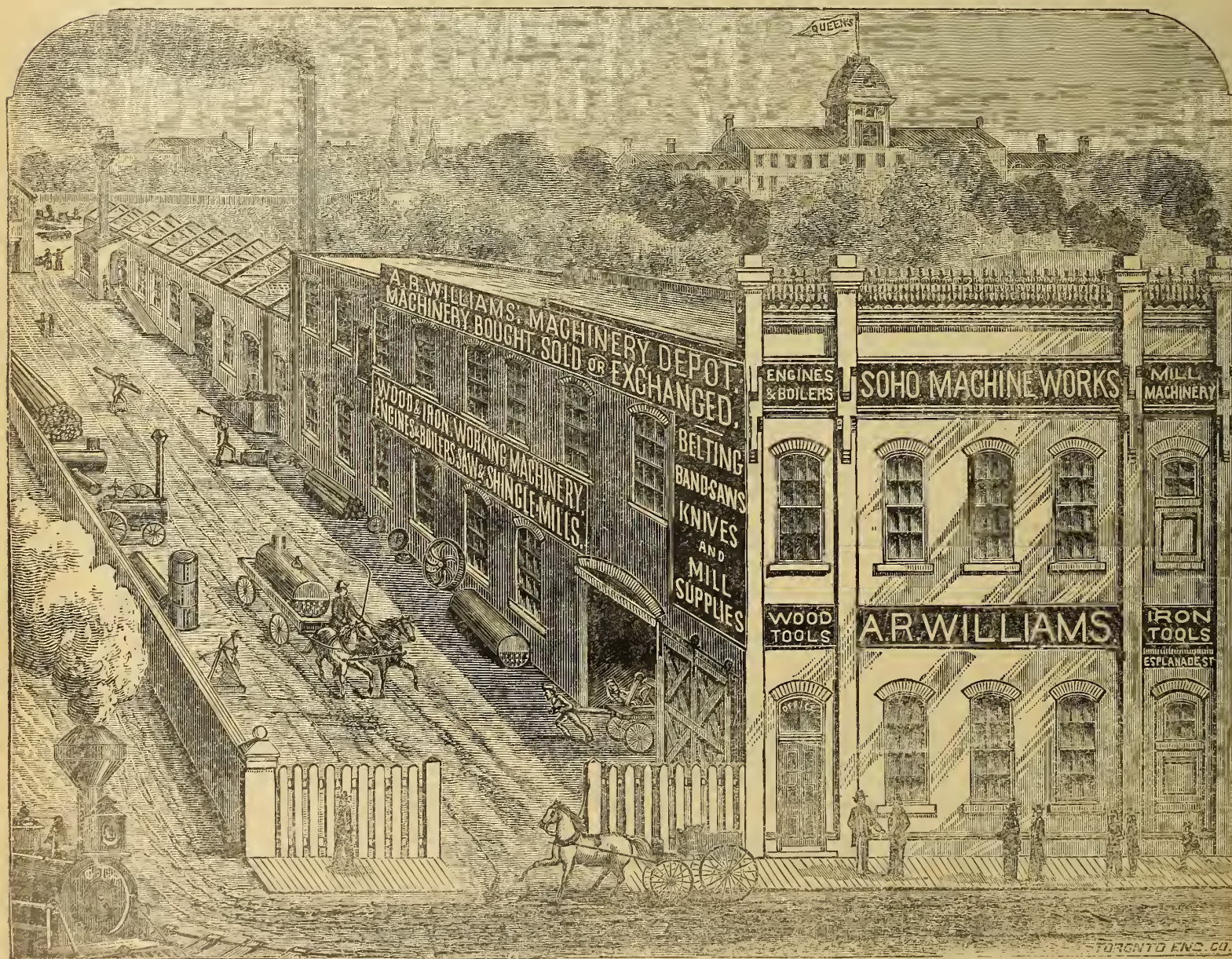
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Canadian Mining Review



Vol. V.—No. 7.

1887.—OTTAWA, SEPTEMBER—1887.

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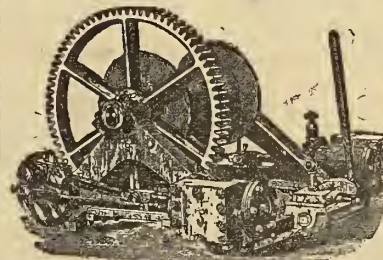
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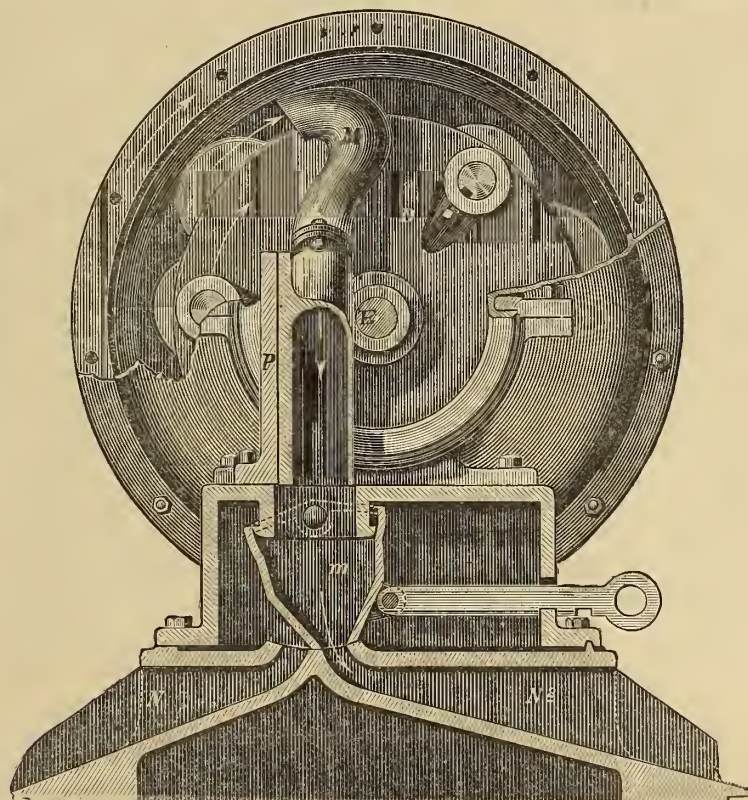
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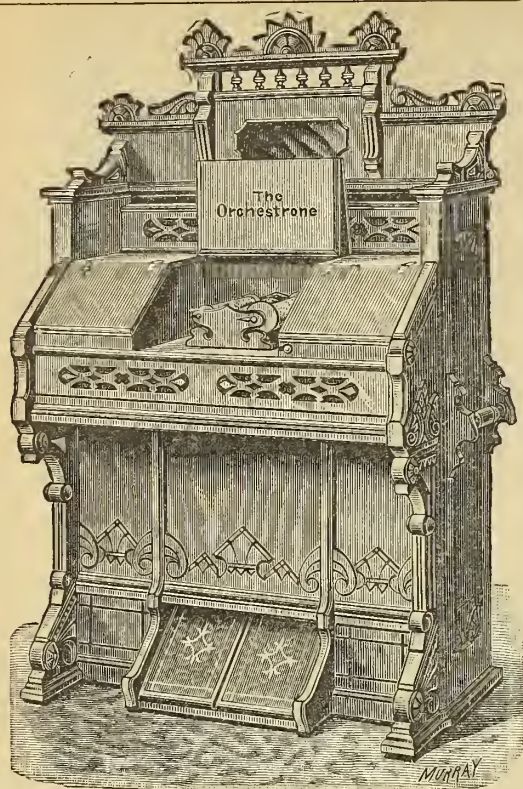
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D. POTTINGER,
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Railway Office, Moncton, N.B.
Nov. 22nd, 1886.



Department of Inland Revenue.—An Act respecting Agricultural Fertilizers.

The public is hereby notified that the provisions of the Act respecting AGRICULTURAL FERTILIZERS came into force on the 1st of January, 1886 and that all Fertilizers sold thereafter require to be sold subject to the conditions and restrictions therein contained—the main features of which are as follows:

The expression "fertilizer" means and includes all fertilizers which are sold at more than TEN DOLLARS per ton, and which contains ammonia, or its equivalent of nitrogen, or phosphoric acid.

Every manufacturer or importer of fertilizers for sale, shall, in the course of the month of January in each year, and before offering the same fertilizer for sale, transmit to the Minister of Inland Revenue, carriage paid, a sealed glass jar, containing at least two pounds of the fertilizer manufactured or imported by him, with the certificate of analysis of the same, together with an affidavit setting forth that each jar contains a fair average sample of the fertilizer manufactured or imported by him; and such sample shall be preserved by the Minister of Inland Revenue for the purpose of comparison with any sample of fertilizer which is obtained in the course of the twelve months then next ensuing from such manufacturer or importer, and which is transmitted to the chief analyst for analysis.

If the fertilizer is put up in packages, every such package intended for sale or distribution within Canada shall have the manufacturer's certificate of analysis placed upon or securely attached to each package by the manufacturer; if the fertilizer is in bags, it shall be distinctly stamped or printed upon each bag; if it is in barrels, it shall be either branded, stamped or printed upon the head of each barrel or distinctly printed upon good paper and securely pasted upon the head of each barrel, or upon a tag securely attached to the head of each barrel; if it is in bulk, the manufacturer's certificate shall be produced and a copy given to each purchaser.

No fertilizer shall be sold or offered or exposed for sale unless a certificate of

analysis and sample of the same shall have been transmitted to the Minister of Inland Revenue and the provisions of the foregoing sub-section have been complied with.

Every person who sells or offers or exposes for sale any fertilizer, in respect of which the provisions of this Act have not been complied with—or who permits a certificate of analysis to be attached to any package, bag or barrel of such fertilizer, or to be produced to the inspector, to accompany the bill of inspection of such inspector, stating that the fertilizer contains a larger percentage of the constituents mentioned in sub-section No. 11 of the Act than is contained therein—or who sells, offers or exposes for sale any fertilizer purporting to have been inspected, and which does not contain the percentage of constituents mentioned in the next preceding section—or who sells or offers or exposes for sale any fertilizer which does not contain the percentage of constituents mentioned in the manufacturer's certificate accompanying the same, shall be liable in each case to a penalty not exceeding fifty dollars for the first offence, and for each subsequent offence to a penalty not exceeding one hundred dollars. Provided always that deficiency of one per centum of the ammonia, or its equivalent of nitrogen, or of the phosphoric acid, claimed to be contained, shall not be considered as evidence of fraudulent intent.

The Act passed in the forty-seventh year of Her Majesty's reign, chaptered thirty-seven and entitled, "An Act to prevent fraud in the manufacture and sale of agricultural fertilizers," is by this Act repealed, except in regard to any offence committed against it or any prosecution or other act commenced and not concluded or completed, and any payment of money due in respect of any provision thereof.

A copy of the Act may be obtained upon application to the Department of Inland Revenue.

E. MIALL,
Commissioner.



Notice to Contractors.

SAULT SAINT MARIE CANAL.

CONTRACTORS intending to tender for works of construction of the Canal proposed to be formed on the Canadian side of the Saint Mary's River, are hereby informed that Tenders will be received about JANUARY next, and that the most favourable time to examine the locality will be between the present time and the early part of November next.

When plans, specifications and other documents are prepared due notice will be given. Contractors will then have an opportunity of examining them and be furnished with blank forms of tender, etc.

By order,
A. P. BRADLEY,
Secretary.

Department of Railways and Canals,
Ottawa, 24th August, 1887.



Notice to Contractors

SEALED TENDERS addressed to the undersigned, and endorsed "Tender for Cobourg Work," will be received at this office until Thursday, the 6th October, for the construction of work at Cobourg, Ont., in accordance with a plan and specification to be seen at the Department of Public Works, Ottawa, and at the office of the Town Trust, Cobourg.

Tenders will not be considered unless made on the form supplied and signed with the actual signatures of the tenderers.

An accepted bank cheque payable to the order of the Minister of Public Works, equal to five per cent. of amount of tender, must accompany each tender. This cheque will be forfeited if the party decline the contract or fail to complete the work contracted for, and will be returned in case of non-acceptance of tender.

The Department does not bind itself to accept the lowest or any tender.

By order,
A. GOBEIL,
Secretary.

Department of Public Works,
Ottawa, 9th September, 1887.



NOTICE RESPECTING PASSPORTS.

PERSONS requiring passports from the Canadian Government should make application to this Department for the same, such application to be accompanied by the sum of four dollars, in payment of the official fee upon passports as fixed by the Governor-in-Council.

G. POWELL,
Under Secretary of State.
OTTAWA, 19th Feb., 1886.

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The CANADIAN MINING REVIEW, is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts, as well as others interested in Canadian Mineral Lands, are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 15th of the month.

Address all correspondence, &c., to the Manager of the CANADIAN MINING REVIEW, Ottawa.

Ottawa as a Mining Centre.

It has been predicted that with the waste which for many years has been taking place in cutting and preparing timber in our forests, and from the want, of any systematised forestry regulations, the time is not very far distant when the lumber trade of Ottawa will shrink into very small proportions from the want of material, and that the large and costly establishments now employing, in this vicinity, so much labour and capital will materially curtail their operations, and practically suspend work on a large scale. The question which naturally arises is, how will Ottawa be affected by such a result? The country surrounding the capital is not an agricultural district compared with Western Ontario; and manufactures are only in their infancy. But just at the very time when this apparently bad outlook looms up a new industry appears and is assuming such proportions that there is every reason to believe it will, before many years elapse, become the leading enterprise of Central Canada, and afford employment for hundreds of busy hands. This industry is mining, and utilizing the product of the mine. The whole country north of Ottawa, wherever the Laurentian range of mountains is met with, possesses mineral wealth of one kind or another. Iron, plumbago, galena or lead, phosphate or apatite, asbestos and mica all are there, and in rich profusion. Few persons, beyond those engaged in mining enterprises, are aware of the richness of this section, and the wealth that has been lying at our very doors for years past, waiting only the hand of man for development. It is of untold value. The plumbago mines at Buckingham, a few years ago, gave every promise of becoming one of the largest industries

in Central Canada, but mismanagement and waste curtailed their operations, and the large crushing mill on Donaldson's Lake being destroyed in the great bush fires, which swept that section of the country, crippled that industry for the time being. These works, however, must eventually be utilized again, and the yield of the mineral is of so pure a quality and so easy of access that the only wonder is they have not again commenced operations. The enormous proportions the phosphate industry has assumed are well known both in Europe and at home here, and United States capitalists are investing largely in phosphate lands and phosphate operations. Not only, as at first, is the mineral mined and shipped, but crushing and pulverizing works are now in operation, and a demand for ground phosphate has arisen amongst the fertilizer companies on the shores of Lake Erie and elsewhere, which bids fair to shortly revolutionise the trade in rock phosphate by shipping only the ground material. Water power is the only cheap motor for works of this nature, and the mighty power of the Chaudiere Falls, which hitherto has been confined to the manufacture of forest products, will contribute its share to the development of mineral wealth as well.

The iron deposits which abound in this vicinity will prove as valuable in the near future as the gold-bearing quartz in the lands where the latter is worked. The iron of this district is known abroad for its excellent qualities, comparing as it does with the finest Sheffield steel, and one mine alone, in the townships of Templeton and Hull, is estimated by Professor Chapman to contain 6,300,000 tons, equal to a daily output of 100 tons of ore, or 60 tons of metal, during a period of a century and a half.

The iron deposits in Bristol are also now a centre of attraction, a number of capitalists having taken them in hand, and the only requisite to perfect a large iron trade in our midst, are smelting works, which time will certainly bring about. Taking into consideration these facts, he who reads the future will see visions of mining industries and their attendant factories supplanting the timber trade, when forest products will require to be handled miles away from their present location. As the demand for timber yearly drives the lumberman further and further up the head waters of the Ottawa and its tributaries, the mills will have to be located nearer to the place of production, and railway facilities for the transport of square timber and deals now penetrate the lumber district to such an extent, that the material loaded on the cars for Quebec, now passes by Ottawa in transit, instead of as formerly being floated here as a distributing point, where it could be rafted or sawn and shipped in its manufactured state. Where is the rafting, that only a few years ago, filled the bay below Parliament Hill with its industry? Where are the raftsmen whose

stalwart forms filled Sussex Street and Lower Town during the summer months? Gone with the advance of railways to other points which demand them. But the miner is gradually filling their place, and although his presence is not yet felt to any extent in the streets, yet we think the banks could tell us something of the large transactions done with him, and of the heavy drafts the pay roll of the mines requires monthly. The settlers on the Lièvre and Gatincau who were virually in the power of the large lumber firms, and who sold their produce to those firms for whatever they could get, are fast acquiring money from the demand the mines make for farm produce of all kinds; and this not for one firm only, but the competitive demand of the various mines enables the producer to ask and obtain a fair value for his hay, his roots, and produce generally. To the mining industries must Ottawa look in the near future for its trade, and although lumber has done much to build up the manufacturing industries of the Capital, mining will do still more, and be a permanent source of wealth, when the pine tree will be as scarce in the Ottawa district as it now is in Western Ontario.

Basic Slag as a Fertilizer.

For some time past the columns of *The Engineering and Mining Journal*, of New York, have been ventilating a very valuable discussion upon the merits and demerits of basic slag as a fertilizing agent. An editorial on the question concludes the matter thus:—

"The discussion upon the qualities or defects of basic slag is brought to a close in our present issue. The obstinate and studied silence with which it has been treated by European chemists leading us to infer that they feel somewhat insecure in their position, and like ourselves, regard the experiments hitherto made known as somewhat onesided, insufficient and unreliable. If the charges brought by Dr. Wyatt should be finally disproved, and the basic process worked in this country upon the promised large scale, our supply of raw phosphatic material will be increased and probably cheapened. If, on the other hand, the charges are sustained and verified, we shall simply be called upon to find a means of eliminating the precious element from its deleterious surroundings, and we have plenty of able chemists who will certainly solve the problem. Every thing comes to the men who can wait."

To us in Canada the question is one of comparatively little moment. With such vast deposits of rich phosphate in our possession, our farmers are in no way dependent upon this source of phosphoric acid. Like our contemporaries, we await further developments with calmness and composure.

A Suggestion.

The irregularity of apatite deposits has been the occasion of much disappointment to miners and the cause of heavy expenditure in exploration, which has been often fruitless. A wide vein of phosphate frequently narrows or pinches out entirely, but the few experiments that have so far been made towards deep mining go to show that the mineral will come in again if followed down. To sink a shaft usually costs about thirty dollars a vertical foot, and the

ordinary miner after spending money in going down a few feet without result is apt to abandon what might prove a richly productive lead. The diamond drill explores at one-tenth of the above cost, and if this were generally used miners could be informed whether outlay upon a shaft would be remunerated by the production of the mineral. A company owning a diamond drill might find a good field for operation among our apatite mines, or if the miners would combine and procure a drill it would be of great service in developing the industry and in preventing unprofitable outlay.

It has been suggested that the Government, through the Geological Survey, might properly conduct some explorations with the diamond drill upon public lands where there are good shows of apatite. If persistent deposits were found, the lands could be sold or leased on royalty and an ample return of the outlay would be obtained. If the search for apatite was not productive, other discoveries might be made or information be secured that would give valuable additions to the geological knowledge of our country.

Low Grade Phosphates.

Owing to the large production by various countries of phosphates containing from fifty to seventy per cent. of phosphate of lime, it has been found difficult to sell the lower qualities of Canadian apatite at remunerative prices. On the other hand there is a scarcity of high grade phosphates, and the demand seems abundant for all that Canada can supply. Whereas the price in England for eighty per cent. Canadian phosphate is now a shilling per unit or eighty per ton, the price for seventy per cent. is only eight pence per unit or four and six-eighths per ton, a difference of eight dollars per ton. It is, therefore, imperative that the quality of the Canadian product should be raised to the highest point in order to secure the most remunerative results. In many districts the impurities associated with the apatite are chiefly micaceous, and experiment has shown that by grinding the ore and by a carefully devised system of blowing and screening a large proportion of the mica can be taken out. In this way sixty per cent. phosphate has been raised to eighty per cent., and the mica saved has gone a considerable way towards defraying the cost of the process. The mica is so freely disseminated that to cob the ore by hand would be expensive and impracticable, whereas it is readily taken out by machinery at an expense of one or two dollars a ton and a saving of perhaps ten dollars a ton is effected. It appears as though the future of our phosphate industry must tend largely in the direction of producing high grade phosphates in a pulverized form, and the consideration of the proper machinery and the establishment of mills in suitable locations are among the most important claims upon the attention of our phosphate producers.

Our Mineral Exports.

The following official figures are given by the Department of Agriculture to show the value of exports, distinguishing Canadian produce from those of other countries, for the years ending 30th June, 1884, 1885 and 1886:—

1884.		
MINERAL.	Domestic.	Foreign.
Coal	\$1,201,172	\$157,177
Gold-bearing quartz, dust, nuggets, etc.	952,131	.....
Gypsum, crude	160,607	.....
Oils, mineral, crude and refined ..	7,546	192
Ore, antimony	4,855	.....
“ copper	214,044	.....
“ iron	66,549	.....
“ lead	5	.....
“ manganese	15,851	.....
“ silver	12,920	.....
Phosphates	453,322	.....
Plumbago .....	.....	.....
Salt	17,408	37,387
Sand and gravels	14,152	.....
Slate	11,445	.....
Stone and marble, unwrought ..	52,478	.....
Other articles	62,607	643
Total produce of the mine...	\$3,247,092	\$195,399

1885.		
MINERAL.	Domestic.	Foreign.
Coal	\$1,468,166	\$180,046
Gold-bearing quartz, dust, nuggets, etc.	9 9,007	.....
Gypsum, crude	120,046	.....
Oils, mineral, crude and refined ..	27,303	548
Ore, antimony	33,700	.....
“ copper	246,230	.....
“ iron	132,074	.....
“ lead	36	.....
“ manganese	22,790	.....
“ silver	7,539	.....
Phosphates	362,288	.....
Plumbago	60	50
Salt	12,326	14,223
Sand and gravels	23,590	.....
Slate	4,642	.....
Stone and marble, unwrought ..	52,206	700
Other articles	127,534	1,366
Total produce of the mine...	\$3,639,537	\$196,933

1886.		
MINERAL.	Domestic.	Foreign.
Coal	\$1,416,160	\$182,717
Gold-bearing quartz, dust, nuggets, etc.	1,210,864	.....
Gypsum, crude	114,736	.....
Oils, mineral, crude and refined ..	30,957	214
Ore, antimony	38,320	.....
“ copper	291,397	.....
“ iron	23,039	.....
“ lead .....	.....	.....
“ manganese	45,608	.....
“ silver	25,137	.....
Phosphates	431,951	.....
Plumbago	1,481	.....
Salt	26,749	13,204
Sand and gravels	23,195	.....
Slate	4,552	.....
Stone and marble, unwrought ..	61,950	.....
Other articles	205,051	5
Total produce of the mine...	\$3,951,147	\$196,140

From these figures it will be seen that there has been an increase in the total amount of \$310,817, the principal progress being in gold, copper, phosphates and salt. The decrease in iron, has been considerable, but under the new protective tariff this industry is now rapidly regaining ground, and there can be no doubt that much improvement will have to be recorded by next year.

We Doubt It.

It is reported that the Hon. Mr. Mowat has returned from Europe greatly impressed with the wisdom of British Mining Laws and Regulations. The Ontario Premier has en-

quired closely into this matter, and it is said that as a result of his studies the office of his Commissioner of Lands and Forests, and particularly that section of it relating to the mining portion of the community, is immediately to undergo a thorough and complete overhauling. Political wirepullers and other carpet baggers, who have grown fat at the expense of honest prospectors, are no longer to have an unjust monopoly of the cream of Ontario mining lands. Acres heretofore given away to speculators and non-residents, without restriction as to residence and development, are in future to be reserved for those who, by their experience, will best utilize them for the good of the province and of the country. Indeed, we understand that the whole rotten system of Mining Laws now existing in Ontario is to undergo an immediate change for the better. Verily, if true, this will be “tidings of comfort and joy” to those who have so long contended against a code of laws which places a legitimate and immensely profitable source of revenue at the mercy of ignorant untrained persons and unscrupulous speculators, which discourages exploration, and deprives the worthy discoverer of minerals of the just reward of his labour.

Iron and Steel Institute.

The first volume for 1887 of that valuable work, the Journal of the Iron and Steel Institute, London, England, has been received. This book is so well known and has been so often described in these columns that it requires no further mention here more than to state that the very high reputation the work has acquired in past years as an excellent compendium of knowledge bearing on the iron and steel industries is fully borne out by the present edition. Besides containing full reports of the various papers submitted to the Annual Meeting of the institute in May last, Mr. Jeans, the editor, has gathered together and arranged in a very handy manner a vast amount of useful information. We are indebted to this work for several paragraphs in our present issue, and we hope in future numbers to be able to reproduce some of the larger papers for the benefit of our readers.

The Phosphate Trade of Canada.

By H. B. Small, Ottawa.

Continued from August issue.

Dr. Sterry Hunt, who has made a persistent study of the Laurentian rocks for upwards of thirty years, says the question of the continuity of the deposits is important. Veins fitting fissures in the rocks are sometimes continuous for great lengths and to great depths, but their extent varies. Inclined beds of the material, which once were horizontal sheets inclosed in strata that have since been folded or convoluted, should be as persistent in depth as in length and when traced in the outcrop for hundreds of feet may be expected to continue downwards as far, unless a turn of the enclosing strata brings

them up again to the surface. He urges, therefore, deep mining for permanent success, and the experience of the past year proves the correctness of his theory.

Until last year the majority of the workings were superficial, consisting rather of shallow pits or large quarries. The reason for this is traceable to the fact that apatite in its crude state finds a ready sale at all times, even in small lots of five or ten tons. Consequently farmers and others opened pits and trenches for the purpose of extracting what mineral was within easy reach, and with satisfactory results, but so soon as the opening attained a depth at which work became difficult from the want of appliances for hoisting, or from the inflow of surface water, the pit was abandoned for a fresh outcrop close by, and the same process was repeated. The very abundance and value of the mineral thus led to its careless and wasteful handling, and retarded for some time its legitimate growth. With the advent of capital matters assumed a different aspect, and the old unbusinesslike system of mining which characterized the first attempts in the Ottawa district has been abandoned, and deep mining is now engaged in with great promise of abundant returns. The investment of foreign capital, and the organization of powerful companies composed of men of practical business ability and intelligence, together with the introduction of steam power and improved machinery, economy in the management of the mines and the necessity of shipping only a high grade of purity, have now placed these works on a sound and permanent basis. One American company has sunk a shaft on their property nearly 300 feet deep, passing through several deposits of pure phosphate and following the connecting vein which narrowed at certain depths to no greater thickness than a man's thumb. At the depth of 260 feet they struck an apparently unlimited deposit on which they have continued working, running drifts laterally, and turning out a very large yield of apatite of high standard. Another company (Scotch) which only commenced operations last autumn have reached a depth of 100 feet with varying success till that depth was gained, when they came on an apparently solid deposit which they are now working.

The great advantage the Buckingham mines possess is their contiguity to navigable waters, the mines in the majority of cases being situated near the River Lievres. This is a slow, sluggish stream, very deep and only at one point in its course (known as the Little Rapids) where boulders occur and a ledge of rocks crosses the channel, is any obstruction offered to navigation. This is obviated by the use of flat bottomed scows carrying the apatite, being towed to the head of the rapids by a small steamer, where they are let loose to float over it, much in the same way as cribs of timber are sent over the Ottawa "slides," or over the rapids of the Ottawa and St. Lawrence rivers. At the foot of the rapids the scows are taken in tow by

another steamer which tows them to a landing at Buckingham Village, where a short branch line of the Canadian Pacific Railway has trucks waiting alongside the river, into which the mineral is transferred, and conveyed thence direct by rail to Montreal where the cars on arrival, traversing the line of docks, run alongside the vessel which is to receive their contents. The cost of floating the mineral down the river ranges from 30 to 50 cents, according to distance, the freight by rail to Montreal cost about one dollar and twenty-five cents per ton. Ocean freight ranges from three shillings to seven and six pence sterling, although there are times when from want of freight vessels will carry the mineral as ballast free of charge. The value of the crude material in Liverpool ranges from twenty-six to twenty-eight dollars, and from these figures it is easy to see what a profit there is in prosecuting this industry. But it is only by the outlay of large capital in developing and getting operations into thorough working order that this end is attained. The first year seldom leaves any margin, owing to the heavy outlay for plant, buildings, etc. But in the case of two companies, at least, one English and the other American, it is known that after the first year's outlay a dividend of 30 per cent. was declared and paid to the shareholders.

Care has to be taken that the quality shipped is of a proper standard, and not mixed grades. The qualities are known to the trade as firsts, seconds and thirds. The best quality averages from 80 to 85 per cent. of tribasic phosphate of lime, the general run of the apatite shipped ranging from 75 to 85 per cent. The basis of value for 80 per cent. mineral is about 1s. per unit, with a rise of one-fifth of a penny for each unit. To secure an even grade, dressing is resorted to under the name of "cobbing." This is necessitated by the intrusion of mica, pyrites, pyroxene, and carbonate of lime, all useless materials which have to be got rid of, except where large masses of pure apatite have been brought to the surface. Cobbing consists of the separation by hammers and hand picking,—an easy operation owing to the softness of the apatite as compared with extraneous substances—in a building known as a cobbing house partly open at the sides. On one side of this, through or around the interior of which solid tables or stands are located, are empty tram-cars or waggons, into one of which the refuse is thrown as broken off, whilst the apatite thus cleaned is thrown into another receptacle on the other side. Boys and old men are employed at this work, which no machinery has yet been found adapted to perform, and they earn from 50 to 75 cents per day, being paid mostly by piece work. In spite of this system large quantities of the mineral are thrown aside, which, with an improved system, will yet prove of value, much in the same way as the early gold workings of California and Australia yielded rich returns when their tailings were again worked over. A process has been discovered by which its originator claims that

after grinding and pulverizing very low grade material, he can separate the disseminated apatite from impurities, and if this turns out successfully there is room for unlimited manufacture, as the best of water-power for stamping and turning machinery is available at Buckingham.

The various forms in which the apatite of the Ottawa district presents itself are in crystals, sometimes of very large dimensions, in masses varying from compact to coarse granular; in strata of a lamellar texture, and in a friable variety which is abundant, known as a sugar phosphate. The colour varies, some being greenish, often clear sea green, bluish, red, brown of different shades, yellow, white and cream colour. The reddish brown, or nearly claret colour, is the hardest and most compact of all, taking only 12 feet square to the ton, whilst the green and other colours require 16.

Having now given an idea of what apatite is, and of the Ottawa district in which it is worked, it may be well to describe some of the larger mines in that locality. The Emerald Mine, one of the earliest opened, is one of the most productive, and is worked on thoroughly scientific principles. It is situated some 8 miles from Buckingham Village, is owned by the Ottawa Phosphate Company and has changed hands several times, each succeeding purchaser paying higher prices, the last sale clearing the owners over \$50,000, before any large works such as are now carried on there were undertaken. Drifts are now in the side of the hill to the main shaft, by means of which the refuse as well as the mineral are run out on a tramway. Little Rapids Mine is a very valuable property, some 3 miles north of the previous mine. A large number of openings have been made on the property all of which have yielded very good returns. Several deep shafts have been sunk and drifting carried on at various levels in the shaft with great success. This mine is at present owned by an Ottawa resident, Mr. W. A. Allan. The North Star Mine, owned by an American company, contiguous to the previous mine, is yielding handsome returns for the outlay on it, and it is here that the deep shaft of nearly 500 feet, previously mentioned, has been sunk to test the existence of the apatite. A small show on the mineral on the surface, only some 3 inches wide, was selected for the experiment. At a depth of 100 feet this increased out to 5 feet, shrinking below that to almost imperceptible dimensions, and at a still further depth expanding till it overlaid the whole width and extent of the shaft. The Glasgow-Canadian Phosphate Company last year opened a property near the former, and have two deep shafts already sunk, besides other workings, one of which penetrates the face of the hill. The shafts evidence the good results obtained by deep mining, and the company are in a fair way of meeting with rich returns for their expenditure. All the above mentioned mines lie on the eastern bank of the Lievres. Some 8 miles further up, on the left or western bank, are to be found

the High Rock Mines. These are amongst the most extensive of all, and belong to the Phosphate of Lime Company, of London, England, under the management of Mr. Pickford. The property owned by this company covers 1,200 acres. The profits of the three years, 1882-3-4, were sufficient to cover all the outlay and to admit of a dividend of 25 per cent. on the capital stock, besides setting apart \$10,000 as a reserve. Some 25 to 30 openings have been made on the property, and the deeper the works proceed the richer is the yield. Tramways along the face of the mountain, on which these works are situated, carry the refuse to points where it is easily dumped into ravines and so away from the site of any probable future openings. The offices, and buildings for the miners accommodation, are scrupulously looked after, and the company has provided a reading-room well supplied with books, papers and periodicals for their employees use when not working. The mountain is some 1,900 feet above the sea level, and the view from it is very fine, the Laurentian hills in all directions rising one above another till lost in the blue haze of the distance, whilst at the foot of the mountain is a natural beaver meadow, fringed with trees, and nestling as it does amongst the mountains gives an air of quiet and repose in contrast to the busy scene of the works going on above it. The number of men employed by this company ranges from 100 to 150. The Union Mines, belonging to an American company which owns 2,000 acres, are about one mile distant from the High Rock Mines. The work here has been reduced to a minimum by steam hoisting power, steam drills and all the modern appliances. The original capital of this company, \$100,000, was nearly all expended in plant, road making, and shaft-sinking, yet after one year's operations a dividend of 30 per cent. was earned and divided. A tramway runs along the face of all the openings and carries off the debris and waste rock to a ravine at the extremity of which lies a lovely small lake. The escarpment which forms the wall of this ravine shows the course of numerous veins of the mineral all trending eastward and running into the mountain, and the main works are carried on by literally quarrying the hill side, and cutting it away in solid masses. Three years ago on the site of the Union Mines there was nothing but rock and unbroken forest; to-day there are numerous dwellings, substantial offices and storerooms, tramways and good roads. The number of men employed here ranges from 100 to 125.

There are numerous smaller mines being worked all through the apatite district, especially in Templeton, where both Canadian and American capitalists are interested, and new mines are continually being opened. The description given of the mines above mentioned, however, shows sufficiently the magnitude of the various enterprises.

The following table of shipments, each calendar year respectively, from Montreal, of crude

Canadian apatite to be used in the manufacture of superphosphate abroad, gives a fair idea of the yield of the mines of the Ottawa district, as the greater portion of it is derived from them, the Kingston district only furnishing a small yearly amount.

1880.....	7,500 tons.
1881.....	10,307 "
1882.....	15,556 "
1883.....	17,160 "
1884.....	20,461 "
1885.....	24,876 "
1886.....	19,345 "

The question may naturally arise why such a commodity should be sent abroad to be manufactured when apparently it could be treated here and shipped in a condition ready for use, thus adding to our own industries. The reason for this, however, becomes obvious when we ascertain that the pyrites, out of which the acid for dissolving the apatite is not found in quantities sufficient to supply works on any scale within any reasonable distance of the mines. The cost of transport of pyrites would probably exceed the freight of the crude mineral to Europe, where, from the numerous chemical works existing, acid can be purchased far cheaper than it could be made here. Again our Canadian Apatite enters largely into competition with a lower grade phosphate from other quarters in the superphosphate works across the Atlantic. When a demand shall have arisen amongst our own farmers to compensate by the use of phosphatic fertilizers the soil for the loss it undergoes by the constant removal of crops, especially in districts where cattle raising is not largely carried on, superphosphate works may be started with a show of success, in spite of all difficulties. In his Report for 1883 the Minister of Agriculture remarks:—"experience goes to prove that for the production of cereals of every description as well as for the strengthening and renewal of worn-out lands, no available fertilizer is known that can produce such beneficial results as phosphate when subjected to a chemical process."

A curious feature in the apatite trade of Canada is that, although a very large amount of American capital is invested in our mines, almost the whole of their product finds its way to Great Britain, and that a large amount both of crude and manufactured phosphate is exported thence to the United States. There is every reason to believe that both these articles are Canadian produce reshipped, and the explanation given for this by Mr. Torrance, late of the Geological Survey staff, is that it is simply due to the conservatism of trade, as American dealers were in the habit of importing from Britain long before our Canadian deposits were worked, no efforts have since then been made to direct from here into fresh channels a trade which was commenced with the English market by men more familiar with that than with the American.

A wealthy American company has this year commenced operations at the junction of the

Lievres and Ottawa Rivers for grinding and pulverizing crude phosphate, either for acid treatment or for use in the pulverized state. These works are capable of grinding 50 tons per day, and an idea of the fineness of the work done may be formed from the fact that the powder has to pass through an 80 mesh bolt and blowers for separating the mica, leaving only a phenomenal quantity of that worthless and troublesome ingredient. The company have made arrangements by which the ground article can be delivered at cities along the south shore of Lake Erie, where all they can manufacture has been contracted for at a rate of freight of \$1.40 per ton. Hitherto those cities have been using South Carolina phosphate, the freight of which amounted before delivery there to nearly \$4.00 per ton.

In conclusion, Canadians are an agricultural class of people. The essentials for starting Canada's growth are force and material. The climate affords the forces, light, warmth and water; the material, lime, potash, ammonia and phosphate are at its very doors; and with these there is no reason why it should not be one of the most productive countries of the world, if it only uses in a rational manner the means which nature has provided for it.

Mining Developments on the North-western Pacific Coast, and their Wider Bearing.

By Amos Bowman, M.E.*

In the last two years I have had an opportunity to study the conditions of gold-mining in the far northwest of the Pacific Coast—in Cariboo district, British Columbia. That country joins Alaska in lat. 55°; and Cariboo district in lat. 53° to 54°, is three hundred miles north of the forty-ninth parallel. Having previously studied the auriferous deep gravels of California in lat. 38° (in connection with the California Geological Survey, in 1870-71), I am able to contribute a few facts, and comparisons having a wider and more general bearing. My last work in Cariboo district is in continuation of explorations geographical and geological, performed in 1876 and in 1882-3-4, for the Geological Survey of Canada, during which I have seen a large part of the Cordilleran plateau between the 39th and 54th parallels of latitude. The recent work in Cariboo was contributed to jointly by the Dominion and the Provincial Government of British Columbia, and carried out under the direction of Dr. Selwyn.

Before entering the gold region of the plateau proper, in British Columbia, I wish to say a few words in regard to coal and iron—the majority of our members, perhaps, being coal and iron men, connected with large enterprises in those lines, and naturally more interested in them. We have ocular proof in Scranton that coal and iron are elements which bring about solid and permanent developments. This well-built brick and stone city, with its population of 80,000 souls, has grown, we are told, in twenty-five years out of the underlying coal and adjacent iron. Unlimited industries, and the wealth and power of states, can grow out of coal and iron. We of the west are willing to admit that coal and iron, as collateral branches of the mining industry, are quite legitimate.

But we claim that the distribution and the

mining of the precious metals are important and significant in a wider sense. This industry has determined for the United States, and for Canada as well, the lines of immigration and national development. It wrought, in a period of twenty or thirty years, the permanent conquest by the Anglo-Teutonic races of the entire north Pacific coast, along with the dominion of the Pacific ocean. It lifted Australia from the condition of an antipodean colony and made it an empire. It is doing the same work in temperate South Africa. It may do a similar work in temperate South America. Mining of the precious metals accomplishes in the briefest space of history that which leaves its permanent mark on the course of events for a thousand years. It has built our transcontinental railways, and it is precious-metal mining that will make the Canadian Pacific Railway and its projected branches a profitable investment.

COAL AND IRON.

The Pacific coast in general, and the northwest coast in particular, is not lacking either in quantity, quality, or general abundance of coal and iron. It is true that our Carboniferous rocks were not deposited under coal-making conditions, and that Monte Diablo has yielded only an inferior coal. From these facts, with limited knowledge, the impression has gone forth that among the recently extinct and still active volcanoes of the western coast there can be no coal found worth mentioning. I do not consider that I am making any extravagant statement when I say that in British Columbia and on Puget Sound, in adjacent United States territory, we have a repetition of Pennsylvania, in our deposits of coal and iron.

Some mining engineers have called the coals "lignites," because they are not carboniferous coals; but they are genuine bituminous coals, and of first-rate quality.

We have coking coals, too; veins that make different qualities of coke. A coking coal has been mined for twenty years at Nanaimo, Vancouver's Island, and largely used for making gas in San Francisco and Portland. The coke from the retorts is well known in San Francisco. Coking coal exists on the Puyallup, and on Skagit river, in Washington territory, and probably in many other places. When coking coal shall be wanted in that country for smelting iron or reducing the precious metals, it will be forthcoming. The conditions of the country have not called for it, nor for a knowledge of it. The railways have only recently reached that far north and west.†

Anthracite and semi-anthracite have been reported from many different localities. I have seen specimens from Nisqually River, Washington Territory, and Queen Charlotte Island, British Columbia, and coals ranging from anthracite to semi-anthracite from half a dozen other localities. Bow River on the eastern flank of the Rocky Mountain range, yields a good anthracite.

In 1874 I was commissioned by the officers of the Central Pacific Railway Company, in California, to investigate the coal deposits adjacent to their lines in that State, and I was much impressed by two leading facts which were developed. The first appeared in analyses of the Pacific Coast coals in comparison with eastern coals. These analyses, which I tabulated on what I thought a large enough scale, in the number of localities represented, to establish the point, showed that the difference between what were commonly called "lignites" and the bituminous coals and anthracites, of the West and East, resolved itself simply into the

varying quantities of hydrogen which had entered into combination, owing to surrounding circumstances; and that it had very little to do with the age of the formation. Consequently, the application of the term "lignite" generally to western coals was a misnomer. We have also, however, the technical lignites, including the regular Bohemian brown coal. The second point noted was the very wide distribution of the lignites and coals of the Tertiary and Cretaceous formations in that State, wherever these formations extended; from which I drew the conclusion that by no means enough was known from actual development, at that time, regarding the presence of workable coal-veins in California to justify any sweeping condemnation of the whole as insignificant in quantity and inferior in quality. In this I differed from the opinions of others expressed, and current at the time.

I had seen enough to satisfy me that the conditions favourable to coal-making existed in localities wide apart, and at two different horizons, in the Tertiary and Cretaceous periods; for instance, at Monte Diablo and on Pitt River, in Shasta County, in rocks of the upper Cretaceous, and at Lone and Lincoln in middle Tertiary. Indeed, putting that together with subsequent developments, and with what I have myself seen, up and down the coast, and in localities all over the plateau of the cordillera in the latitudes mentioned, I cannot better describe the fact than by saying: "The process of coal-making in one or the other of these periods, although in disconnected basins, was almost universal." Along both shores of the island sea connecting with the North Pacific Ocean at Fuca and Johnston Straits, lies the coal-basin of the North West Coast already mentioned, in extent more than twice the width of the State of Pennsylvania—in the number and size of its veins the equal of anything I know of in the world. Iron is smelted in Oregon, Washington Territory, and in California; and many heavy iron deposits are known, but are of little present value, for the same reason as that which delays the development of our coking coal-veins.

The Cordilleran Plateau.—Without entering into further details on this subject, however interesting, I will, before passing from the coals to the precious metals of the Pacific Coast, briefly define and describe the plateau of the cordillera, to which I have several times referred. Its physical characteristics and its geological history are as important in connection with the coal-forming conditions of the two periods mentioned, as they are in the understanding of our precious-metal zone.

It was in 1858, beginning with the "Frazer River excitement," that the gold-hunting army of explorers began to turn backward from California to the eastward and northward, and so commenced the closer investigation of the cordilleran region. Very nearly simultaneously, between 1858 and 1861, or in general terms about ten years after the first movement to California, the solitudes of Puget Sound, of the Frazer River canons, of the eastern Sierra Nevada, of the Blue Mountains in Oregon, of Cariboo, and of the Rocky Mountains in general, from north to south, were broken by exploring or revisiting bands of prospectors. It was in 1861 that I joined this exploring army. I found out gradually that the mountainous region in question was neither a great basin, nor an irregular mass of mountains, but one great double range of broken chains, having a wide and general-level plateau between them, like two flanges on a wheel; that the plateau was characteristic, and an essential

part of the whole; and that it extended persistently with its accompaniments, and, as it seemed, indefinitely to the northward and southward.

As a whole, this great physical feature of the continent which has proved of so much importance to the precious-metal miner, appeared to be unrecognized; at least, it had no name until 1873, when I ventured, in a paper published in California, to call it (following recognized principles of nomenclature) the plateau of the cordillera, or briefly the cordilleran plateau. The term was precisely descriptive, and it has entered, I may observe, into some of the standard works on physical geography.

You will find in examining it on a globe that it extends not only from the southern end of South America to the northwestern end of Alaska, but that it continues in a direct line (scarcely recognizable on the map, on account of the difficulties of projection) across the Asiatic continent by way of the Yablonai, Altai, and western Tibetan ranges. Continuing in the same line, we find the plateaus of Persia and Arabia, and then the mountains of Abyssinia extending along the northeastern coast of Africa down to the Cape of Good Hope, forming the sea-margin of the African continental plateau. Branching or correlative plateau-ranges extend across Africa to the mountains of the Guinea; and across Europe by way of the Caucasus and the Alps to Spain; but keeping our main feature in view, we have little difficulty in recognizing it as one and the same orographic feature, which, having made America long, makes the Old World broad. I hope I am not travelling too far afield, in attempting to describe the principal characteristics of the cordillera, but so far, I think, we have solid footing, viz., that wherever seen in the direct line of continuation, the most remarkable feature of the mountain ranges in the world, is marked by its characteristic intermediate plateau; and by this token we may know it. Not the least noteworthy feature of the chain of plateaus I have been describing, is the fact that it divides that hemisphere which is nearly all land, from the other hemisphere which is nearly all water.‡

It is quite beyond my range to speculate concerning the causes of this feature, but it is not irrelevant (having found it so far-reaching), to ask the question, whether or not the causes were cosmical?—an inquiry involving glacial theories not entirely disconnected from problems of placer-mining.

Having looked at the plateau chain at large, we are prepared to consider what it is in detail, and in what respects this knowledge concerns the miner.

In alluding to the coal, I did not mention in so many words that the coal-forming conditions which existed from middle Cretaceous to middle Tertiary time, extended along the Pacific coast for thousands of miles upon the flanks of this line of plateaus. Its accompanying shore-sediments enter fiords of the Cretaceous period now far inland; formerly at sea-level, now presenting cliffs of pebble conglomerate six thousand feet above it, and along the eastern as well as the western flanks; while those of the Tertiary period, independently of the Cretaceous, lie in the positions of lake-basins covering scattering almost the entire plateau of the cordillera, at least in the north.

Rising of the Plateau.—A remarkable thing happened about the time our first Pacific coast coal was forming. It was nothing less than the first rising upward of this plateau of the cordillera. Its geological history, however

simple, has grown upon this very slowly. Geologists had to investigate it piecemeal, before they could put their observations together. And so it is all along the line.

To be continued.

The Canadian Iron Trade.

In a paper read before the recent gathering of the American Institute of Mining Engineers, at Duluth, Mr. J. H. Bartlett, M. E., of Montreal, said: There are two reasons which make the present time an appropriate one to direct attention to the field offered for enterprise in this direction, the first being the very favourable reports of the experts who examined and reported on the Canadian exhibit of minerals, particularly coal and iron, at the Colonial and Indian Exhibition, held in London, England, last year; the second and more important reason being the recent changes in the Canadian customs tariff inaugurated in May last. The tariff is now generally two-thirds of the American tariff, in addition to which the government, in order to encourage the manufacture of iron, grants a bounty upon pig iron made in Canada out of Canadian ore. In a paper presented to the Institute at the Halifax meeting, the writer gave a review of the various attempts to manufacture iron in Canada. The facts then presented were not such as to offer much encouragement to anyone to embark in similar enterprises under the conditions then existing, but, happily, these conditions are now changed and an early development may be anticipated. It will be remembered that the various provinces now forming the Dominion of Canada were only confederated in 1867, previously they were all separate and distinct colonies, each with its own fiscal tariff, and having only their own small market. Even after confederation the customs tariff was simply a revenue, not a protective tariff, until the year 1879 when the first effort was made in this direction, and an import duty of \$2.00 per ton was imposed on pig iron, whilst previously it had always been admitted free of duty, but the iron section of the tariff was very incomplete. As Canadian iron workers wages are regulated by Pittsburg wages, it is impossible to compete with Belgian, German and English manufacturers whose wages are on a much lower scale, unless sufficient protection is afforded. With one single exception all the attempts to manufacture iron in Canada have been with the use of charcoal as a fuel, and many of the attempts were made early in the century, and the operations were of very small dimensions. The only furnaces which have been successful have used bog iron ore and have made only a few tons of iron per day. A great bar to the trade has been a want of information regarding the extent of the market to be supplied. This difficulty has been to some extent removed, the writer having collected and tabulated the statistics of the Canadian iron trade for all the years since confederation, so that it is now possible to see what has been required in the past and to estimate what will be necessary in the future. For a young though large country with a small population, the amount of iron and steel consumed in Canada is remarkable. In the year 1878 a greater money value of iron and steel was imported into Canada than into the United States; and not making any iron of our own, the value of our consumption and imported iron and steel, per capita of the population, is always many times as much as the value of the imports per capita into the United States. The total balance of trade against

Canada up to the year 1886 was \$381,000,000. The total value of the imports of iron and steel during that period was \$253,250,000, from which it may be assumed that the balance of trade would have been in our favour had we made our own iron. The average annual value of our iron importations is about fourteen million dollars. The average weight of the rougher descriptions of iron and steel such as pigs, bars, plates, sheets, rails, etc., being about 250,000 tons in addition to which the weight in the imports of castings and forgings, hardware and manufactures, machinery and engines, etc., is very considerable. In almost every province iron ore is found in abundance and the provinces which have not coal have an abundance of timber fit for making charcoal. We possess the only deposits of coal on both the Atlantic and Pacific shores and in both Vancouver island and Cape Breton the coal seams run out under the ocean. In both these provinces of British Columbia and Nova Scotia, nature has been prodigal with deposits of various descriptions of iron ore of very good quality, and with plenty of flux all in the immediate vicinity of the coal fields. San Francisco is largely supplied with Nanaimo coal, and the blast furnaces in Oregon get most of their iron ore from Texada island in British Columbia. The eastern cities of Portland and Boston are supplied with some of their coal from Nova Scotia, and it would appear possible also to supply iron ore to eastern furnaces from that province. In New Brunswick both coal and iron are found. In both Ontario and Quebec there are immense deposits of the finest quality of iron ores and an unlimited supply of charcoal timber. In Manitoba there is iron ore and they have about 15,000 square miles underlaid with coal. In the North West provinces, the great future wheat producing country of the continent, there are deposits of iron ore reported, but the country is so vast that no special explorations have been made for it. They are, however, working a large deposit of anthracite coal at Anthracite, N. W. T., of a quality which compares favourably with the best from Pennsylvania, and there are 500 square miles of this section. The climate of this country is cold, but there are 50,000 square miles of it underlaid with coal of good quality and it is easily reached and worked, seams estimated to yield from five to nine million tons per square mile.

MISCELLANEOUS PARAGRAPHS.

Iron Ore in Nova Scotia.—Mr. E. Gilpin, in his *Report of the Mines of Nova Scotia*, reports the discovery of iron ore at Grand Lake, Halyan County, and in the Long Island district, Cape Breton County. Here the outcrop of two deposits of red hematite was opened. The ore was found to be of excellent quality and as much as ten feet in thickness. The deposits are situated very favourably on the side of a high hill and only a few yards from deep water.

A Remarkable Water Wheel.—The water-wheel that runs the works of the Sagadahoe Fertilizer Company, at Bowdoinham, Me., is probably the only one of its kind in existence. It is 27 feet in diameter, with a foot of its rim out of water at high tide. The spokes are wide and set diagonally, like the vanes of a

windmill. It turns eighteen hours of the day by tide power, running one way with the flow, the other with the ebb. With one foot fall of the tide, this wheel gives about fifty horsepower. It has been in use since 1691.

Relation of Coal-Dust to Mine Explosions.—Mr. Arthur Watts, Bede College, Durham, referring to a former letter to *Nature* in which he suggests that keeping the ventilating air current saturated with aqueous vapour might prove the most effective way of rendering the dust in coal mines innocuous, has, he says, been since shewn to be practicable in a South Wales colliery. Since then he has considerably extended his research, with results that confirm the conviction expressed in his letter, that many of the most disastrous colliery explosions during the last seven years in the northern portion of England have been practically dust explosions, and, therefore, preventable; that the rough method of watering the floors only, or the floors and sides, of the mines is delusive, since it leaves the most dangerous dust undisturbed, the upper and flocculent dust; and last, that probably the reasons why dust in dry pits does not explode more frequently are now within grasp. To this latter conclusion he writes:—"That every firing of a shot that is accompanied by flame in a dry pit does not produce an explosion is well known; that *sometimes* such firing of a shot *does* is unhappily also well known. That the local presence of gas, even in small amount, is sometimes the reason of this is universally acknowledged. That the amount and condition of the dust present (even in the practical absence of gas) is at other times the reason is now believed by many. Setting aside the *amount* of dust, which every one will allow must be an essential factor, and also the varying energy which the shot, blown out or not, develops, let us look at the other conditions. The temperature and hygroscopic state of the air current is one most important factor, and consequently the concomitant temperature and hygroscopic state of the dust traversed by such current. Beyond this, the *degree of fineness* and the *constituents* of the dust will have much to say in the matter. The finer the particles the more readily will they ignite, and more completely will they place their substance under the influences present. Thus ordinary screen coal dust will not ignite when a common match is lighted and applied to it, but it will when finely pounded in a mortar. Now the dust resting on the banks and upper portions generally of the ways will invariably so light and burn when dry, although the constituents vary greatly in different pits and in different seams of the same pit. What are the ordinary *constituents* of coal dust? Two, perhaps three, important substances, and others unimportant; important, as being inflammable in varying degrees; unimportant, either from their inflammability or from their excessively small amount. The three important are mother of coal or *dant*; coal, and certain coloured bodies, probably *spores*. The unimportant are shale or other stone dust, iron pyrites, lime flakes and incidentals, as animal and vegetable matters, and the results of the wear and tear of the haulage and winning apparatus, &c. Dismiss these last, as only one needs attention, the shale; and that special, not general. *Dant* lights most readily; the red end of a used match is often sufficient to fire it, and their burns itself out whether resting on wood or on stone. Burned in a retort it loses little weight, and the fumes it gives off will not ignite. Now this *dant* is largely present in upper and

flocculent dust, reaching in some specimens even 70 or 80 per cent. Dant clearly, therefore, is not itself dangerously explosive, yet it is admirably fitted to act the part that tinder use to do, when it handed on the spark from the flint and steel to the old fashioned brimstone match. Coal forms a considerable part of all upper and flocculent dust, and constitutes the great mass of the bottom dust along intake haulage roads. Coal dust (got as free from dant as possible) when pounded very fine ignites with some difficulty, burns at first somewhat fiercely and with considerable smoke, but generally goes out leaving a portion of the heap unburned. Placed on an iron plate, and burned by heating the plate, it threw off scintillations, its fumes readily took fire, and forty grains of dust were reduced to one grain of ash. In a report it gave off first much smoke which would not light; soon, however, the smoke lessened, when its fumes lit and burned with a long bright flame. Such coal dust is manifestly capable of producing an explosion. Under favourable conditions it can produce a considerable amount of illuminating coal-gas, whose presence would convert the air current into an explosive mixture. Therefore, adopting the former simile, as the dust is the *tinder*, so this coal is the *sulphur match*, as the shot flame or other initial cause is the *spark* struck from the flint and steel.

The Cost of Boring Petroleum Wells.

—Mr. C. D. Wilder, of Chicago, in a recent report on the natural gas and petroleum deposits of the United States, gives the following as the cost of boring petroleum wells in the neighbourhood of Lima, Ohio:—

Outfit, consisting of lumber for sills and braces, used in derrick works and for wheels.....	\$375
Engine, boiler and fittings.....	750
Total.....	\$1,125

The cost of putting down the well is, on the average, about one dollar per foot, there being a large amount of shale, slate and sandstone, and but little sandstone present. Even in an untried country, wells may be bored at a contract cost of \$2 per foot, for any depth without reference to the nature of the rock.

British Mineral Production.—From the annual reports of the Inspectors of Mines to Her Majesty's Secretary of State, just issued, we learn that the total quantity of minerals produced throughout the various districts of the United Kingdom, during the past year, was 170,006,959 tons, of which 157,511,482 were coal and 8,862,648 ironstone, the rest being fire-clay, oil shale and other minerals, being a total decrease of 3,217,001 tons compared with the preceding year, the decrease of coal being 1,832,936, and of ironstone 1,245,964 tons; 210,665 tons of mineral were wrought for every fatal accident, and 178,391 tons for every death, as compared with 214,651 and 150,620 tons respectively in the preceding year.

Canada Called to Account.—Canada has been called to account by the Mother Country for her temerity in seeking by higher import duties to build up an iron and steel industry worthy of the name. English iron and steel manufacturers, alarmed at so radical a change, asked the Colonial Secretary for information on the subject. Canada's answer, in the form of a report of a committee of the Privy Council of the Dominion, is direct and to the point. In-

deed, so direct and pointed is it that the *Colliery Guardian* is led to exclaim that "if there were any doubt before, no doubt can be any longer entertained that Canada is resolved upon having her own iron and steel industries." Well, it does have that appearance, truly. And what, we may ask, is the objection to that? The Privy Council declare that Canada possesses in an advantageous position abundance of iron ore, fuel and all the requisites for the manufacturing of iron and steel, and that she is "compelled in self-defence, as against America, to adopt a tariff policy in some measure approximating that to the United States in order to protect domestic industries and to develop the natural resources of the Dominion." She also pleads that in the steps taken by the Canadian Parliament to foster the manufacture of iron and steel and to place the industry on a firm foundation at the outset, "Canada is but following the methods adopted by Great Britain, France, Belgium, Germany, the United States, and other countries which have succeeded in promoting this great industry." This is certainly a cogent argument, however idly it may fall upon the ears of Free Trade Great Britain, and we cannot but admire the pluck of the younger country in taking a stand so much at variance with the generally recognized sentiment in England and at the same time so in accord with the experience of the United States in respect to industrial growth.—*Iron Trade Review*.

Application of Electricity to Mining Operations.

—There are several advantages inherent to electric method of transmitting power which render it very suitable for mining operations. With the view of contributing to a greater familiarity with electrical methods among those engaged in superintending mining operations, Mr. F. J. Rowan, in the *Transactions of the Mining Institute of Scotland*, has compiled a very complete record of the various installations which have been actually carried out. The following are the instances quoted of electrical transmission of power in mines:—(1) Pumping in Trefalgar Collieries, and at Thallern Colliery. (2) Winding, at Trefalgar, at Thibaut shaft, St. Etienne, at Péronnière Colliery, and at the Blanzly collieries. Haulage at Zankerode Colliery, and at Benthén. (4) Ventilation at Zankerode Colliery, at Trefalgar, and St. Claude, near Blanzly. Other application illustrating generally the electrical transmission of power are referred to, and comparisons between the various systems of transmitting power are instituted. These comparisons show that electrical methods have no cause to fear competition either as regards cost or efficiency. The longer the distance and the greater the amount of power to be transmitted, the more favourably does electrical transmission compare with other systems; but for this reason it has had a worse chance in early attempts than it would have had if its efficiency were greater on a small scale of distance and power.

Discovery of Semi-Anthracite Coal in British Columbia.

—A large deposit of Semi-Anthracite Coal is reported to have been made at Martin's Creek in the Kootenay District, B.C. It is described as follows:—If the reader imagines himself walking from west to east along the trail which follows the course of the creek, he will have the steep rounded hill immediately to his left with the well defined strata of yellowish grey sandstone dipping towards him at an angle of

thirty degrees. The first coal seam which he will come to, and which is almost on the trail, is the "Peter Seam." This has been opened up by driving in a tunnel for thirty feet and then laying bare the hanging and foot walls. It shows fourteen feet of pure coal, without a sign of shale or dirt. The hanging wall is grey sandstone, the foot wall a dark shale. A short way up the hill is No. 1 seam, on which the face has been cleared away to show the walls. Here there are three feet of pure coal, lying on four feet of coal with a little shale mixed with it. Not many feet above this is No. 2 seam, on which the face has been opened so as to show the walls. Here there are five feet of pure coal lying on two feet of coal with a slight mixture of shale. About fifty feet above this is No. 3 seam, on which the face has been opened as before, and here we have five feet of good coal, mixed with a little shale here and there. Not many feet above this is No. 4 seam, showing seven feet, of which five are pure coal and the remainder coal and shale. We now descend to the trail again, and here directly on the trail itself we have the "Jubilee seam." On this a tunnel has been run in for fifty-five feet and then the walls exposed. It shows thirty feet of clean, pure coal, without a sign of shale or dirt, and below this, five feet of coal and shale mixed. About eighty feet below the "Jubilee" is another seam, showing nine and a half feet of coal. About fifty feet below this is the "William seam," which is now being laid open, and which twelve feet of coal shows above the foot wall and the ranging wall has yet to be reached. All these seams have been found within a distance of 700 yards and within a period of two months, so that it is not too much to expect that more seams will yet be discovered. The course and dip of all the seams are the same, and the strata is remarkably regular and well defined. There is no appearance of a "fault" for many miles around. In all the seams the walls are similar and the coal has the same appearance to the eye. It may be described as being very black and shining, with a brilliant resinous appearance; does not soil the fingers; brittle, but becomes harder as depth is reached; powder jet black; hardly acted upon by nitric acid; no appearance of sulphur; burns with a bright clear glow and little smoke, and leaves very little ash; has been used for pointing and tempering the "picks" with excellent effect.

Stamps and Stamps.—As an illustration of the difference between stamps and stamps, for the benefit of inexperienced investors in mining properties, the following official statements of the work of the El Callao Gold Mining Company, of Venezuela, may be of interest: The company has two mills of 60-stamps each, one built by a good firm of engineers but inexperienced in mining machinery, the other supplied by Messrs. Fraser & Chalmers, of Chicago, representing the best modern designs and workmanship. Both mills are run under one management, and the old mill has been much improved over its original condition. Old 60-stamps crushed 31,770 tons in 48½ weeks; cost, 2460 francs a ton. New 60-stamps crushed 29,000 tons in 25 weeks; cost, 860 francs a ton. New 60-stamps will probably crush 60,000 tons in 51 weeks. The rock is hard gold quartz, and the above figures will show one of the little, unsuspected aids to success in mining investments, which prove that there is a difference even in stamp mills, and that economy in first purchase of machinery is not necessarily a good policy.—*E. and M. Journal*.

Journalistic "Rot."—In a voluminous issue of 21st August the *Globe-Democrat* stuffs its readers with the following rubbish under the head lines:—

A LIFE OF ROMANCE.

A Successful Miner who has had his
Share of Adventure.

Once the Owner of the Comstock
Lode.—A Quarter of a Cen-
tury's Experience in
Mexico, &c.

Including the portrait of the hero whose adventures we are told "almost suggest the great improbabilities of Mr. H. Rider Haggard." This romance fills three columns, of which more than two-thirds constitute, as it were, the vestibule leading to the miraculous discovery of the chief of "lost mines of Mexico," the "Realto," in the heart of the mountains of Sonora, 140 miles from the nearest railroad, worth "untold millions" as shown, we are told, by the remains there found, "ranged in a semi-circle about a clear and powerful spring which burst from living rock * * * of seventy *arastras*, the circular pit used in primitive times for the crushing of ores." And at the mines upon the cone of a mountain reached by a roadway "hewn out of the solid rock that must have cost \$20,000," were found "two enormous chambers cut out of the rock, in the quartz floors of which shafts were sunk," but these were found so "choked with drift and vegetation" that the discoverer says he had no means of exploring them; nor was any dump pile to be found. Neither does it appear that any ore was seen—or any other evidences of a mine, we repeat, than some chambers cut in the quartz, several unexplored shafts and a semi-circle of seventy *arastra* beds. Merely upon such meagre indications, the hero of this story rushed to Gerichi and there officially announced and located the mine, and a week later was on his way to the United States, in some part of which he found a shoal of fat gudgeons out of which to form a stock company with a capital of \$3,000,000 and with a view, ultimately, out of their spare capital, to build a short railroad of only 140 miles over the mountains and barancas of Sonora. Such a cheap trifle as a 50-stamp mill with a plant of other reduction appliances, including smelting works, are to be taken out and set up at once and Mr. Power, the fortunate discoverer, left St. Louis for the Realto mine, we are further told, on the 20th August, to superintend these works, after which, we presume, he will pay some attention to the lesser detail of ascertaining whether any ore of any description is to be found: or, in other words, whether there is a mine there to be worked.

Prospecting.—When one is prospecting for quartz, writes Mr. G. C. Swallow, he wants a good eye for the indications in the rocks and for the fragments of quartz lying on the foot hills and mountain sides as he travels over them. A stray piece of good looking quartz will challenge his attention as a fragment from some lode. When such a fragment is found, the first question is, "where did it come from?" Is it water-worn and rounded, or angular with sharp corners? If water-worn or rounded it has traveled by stream or glacier, and the prospector must seek its lode above on the line of such stream or glacier. Ores have thus been traced to their source for hundreds of miles. But for gold and silver quartz in these mountains, the source of these stray specimens must be sought at the gulches on which they are

found. If the specimen has not been worn and rounded and has sharp angles, it has not traveled far from its lode, which must be sought above in the mountain side. It may be traced by following a line of like specimens up to their source. Where the line of specimens ceases, the prospector may expect to find the vein, by the croppings or other indication of the lode. If the rock is bare this part of the work is soon done; but if covered up, it must be cleaned off by sinking a shaft and following the indications, or fragments of quartz. When the lode is found, the work of the prospector is finished and the development begins. Such a discovery is called a "prospect," and the holes dug to discover it are called "prospect holes," or "prospect shafts." Prospecting for placer gold is generally more laborious; but it keeps the prospector more stationary. When he finds a gulch that suits his notions, he sinks shafts to bed rock and tests the gravel as he goes down by washing and panning it. Experience in mining and a knowledge of glaciers are most useful in prospecting a gulch and its benches or "bars" as the miners call them. It is generally very easy to prospect a "bar," but there is great difficulty in prospecting a gulch or valley where the water is abundant. There are many gulches where there is every reason to believe the gravel on bed-rock is very rich; but the bed-rock water is so abundant those gravels cannot be easily reached and prospected. To remove this water and enable the prospector to test the gravel and bed-rock, is often very expensive, as many of our miners can testify from hard experience. Expensive hydraulic machinery is sometimes necessary to remove the water. Streams and even considerable rivers are at times turned from their channels for the purpose of working the gravel and sands in their beds.



The following shipments of Canadian ore have been made from Montreal from 10th August to 3rd September, 1887:—

Date.	Shippers.	Ship.	Destina- tion.	Tons.
Aug. 10	Lomer, Rohr & Co.	s.s. Navarro...	London	107
" 10	Wilson & Green...	do	do	285
" 10	Anglo American	do	do	150
" 10	Phosphate Co.	do	do	187
" 10	Lomer, Rohr & Co.	s.s. Alcides...	Glasgow...	126
" 11	"	s.s. Berbie...	Liverpool...	292
" 12	"	s.s. Scotland	London...	90
" 18	"	s.s. Avlona...	do	704
" 20	Wilson & Green...	s.s. Oxenholme	Liverpool...	369
" 22	Lomer, Rohr & Co.	s.s. Gallego...	do	133
" 22	R. C. Adams	do	do	147
" 22	Gillespie Paterson	do	do	131
" 24	Lomer, Rohr & Co.	s.s. Cydthia...	Glasgow...	223
" 24	"	bar. J. Remich	Greenock...	146
" 31	"	s.s. Toronto...	Liverpool...	226
Sept. 3	"	s.s. Wash. City	London...	235
" 3	Wilson & Green...	do	do	250
Total....				3,645

It is thought that the output from the High Rock Mine for this month will be in the vicinity of 540 tons, the greater portion of this having been mined from the large show in pit No 11, which still holds out as good as ever. The company has over 2,000 tons of first-class ore ready for shipment, but on account of the very low state of the river at present the management are unable to get their ore over the Little Rapids. Mr. Pickford, sr., with a gang of men constructed a dam at the right chute

in the hope of raising the water on the left bank which would allow their scows to get over. Their labours were, however, rendered futile by the logs from the drive which destroyed the dam, and it now looks as if the company will have to wait for rain.

The low water is also hindering the output from the North Star Mine.

There is nothing to report from the Union Mines. Work is being conducted smoothly, and the output for the month promises to be fully up to the average.

The new opening made in the beginning of the month on the south side of lot 6, at the Little Rapids property, promises to be one of the best of the many fine shows on the property. The superintendent is about to place a boiler and engine at the new opening in order to assist in the workings. An air pipe will also be run in from the Air Receiver in order to work the drills. The shipments for the month amounted to 180 tons of high grade ore.

Three shipments of ore from these mines during the present season have averaged 84.66—a highly satisfactory result. This is the best average we have yet heard of from a three shipment lot.

Mr. Jas. White, of the Geological Survey, who was injured in the tram-car accident last month at Little Rapids mines is progressing satisfactorily. He is still at the Protestant Hospital, Ottawa, under the care of Dr. Horsey, who has set the broken limb in Plaster of Paris. Mr. White hopes to be able to be removed to his private quarters in the course of a day or two. The *Review* man has now fully recovered and has resumed work.

Captain Henwood, the Superintendent of the Emerald Mine, has been the lucky finder of what promises to be an unusually fine show, for during the past month a fine vein of ore, thirty-four feet in length and four feet in width, has been uncovered. In colour it is a very light green and somewhat different to any of the ore hitherto found on the property. The output for August was 600 tons.

We are informed that work has at last commenced on the new lock and dam at Little Rapids. Such an improvement is very badly wanted, particularly at present when the water is so low that the miners are prevented from shipping their ore down the river.

English prices for high grade phosphate are firm, upwards of 1,000 tons having lately been sold at 1s. for 80 per cent. with 1½d. per unit rise. Freight is about 6s. to Liverpool and 8s. to London.

There is nothing new to report from the mines of the Anglo Canadian Company at Otty Lake. The Du Lievre mills, at Buckingham, are grinding some of their phosphate, and succeed in taking out a good deal of mica by their bolting process.

At Blackburn's mine there is a large quantity of ore in sight. The management are making extensive preparations in timbering to secure further economy in working.

Interesting Statistics.

The following figures show the mineral exports, domestic and foreign, from 1868 to 1886 :—

1868.....	\$1,446,857	1878.....	\$2,816,347
1869.....	2,093,502	1879.....	3,082,900
1870.....	2,487,038	1880.....	2,877,351
1871.....	3,221,461	1881.....	2,767,829
1872.....	5,326,218	1882.....	3,013,578
1873.....	6,471,162	1883.....	2,970,886
1874.....	3,977,216	1884.....	3,247,092
1875.....	3,878,050	1885.....	3,639,537
1876.....	3,731,827	1887.....	3,951,147
1877.....	3,644,040		

MINING NOTES.

Nova Scotia.

According to official report the following is a comparative statement of the production of coal, iron ore and manganese ore during the Province for the years 1885 and 1886 :—

	1885.	1886.
Coal.....	1,352,205.....	1,502,614
Coke made.....	30,185.....	31,601
Iron ore.....	48,129.....	44,388
Manganese ore.....	353.....	427

At Bridgewater Messrs. Ramey, Mulock & Co., who have two properties containing one hundred areas, on which they have been working for some months past, have opened up two large gold-bearing leads, measuring $5\frac{1}{4}$ feet and $2\frac{1}{2}$ feet respectively. At least three other leads not yet developed run across the property. These properties situated as they are, right beside a main highway, only two and a half miles from Bridgewater, and with a large water-power not half a mile distant, are evidently very valuable.

New Brunswick.

The interest in manganese mining is still on the increase, and steps are now in progress looking to the final sale of the Stockton Gold Mine on Smith's Creek road, at a handsome figure.

In the Dutch Valley, on what is known as the Glebe property, Mr. W. N. Gould is making an excellent showing, and the manganese is of a very superior quality. Shipments from the property will soon be made. The owners are well satisfied with the expenditure they have made in this locality.

Major Markham, of the Markhamville Manganese Mines, still continues to ship large lots of this material to the United States and English markets. The Major is well-known in mining circles, and takes a deep interest in all mining matters of a satisfactory nature.

Dr. A. H. Chandler, of Dorchester, N.B., in connection with some friends, is making very satisfactory developments on a gold property at Renfrew. The specimens they have on exhibition are certainly of a very valuable nature, and bid fair for the opening of a remunerative mine.

A preliminary examination of the silver and lead mine at Elm Tree, in Gloucester County, N.B., has recently been made, with a view of placing it into the hands of capitalists. The chances are that this property may yet pan out in good shape.

The work on the New Ireland Copper and Silver Mine in Alberta County is still continuing. An examination of the property has recently been made by a competent expert connected with one of the prominent gold mines in Nova Scotia. The prospects are, it is said, good for a sale being affected.

A Mr. McLean, of Charlotte County, has lately acquired and partially developed a large body of iron pyrites in that County, said to be suitable for the manufacture of sulphuric acid. If this be correct, Mr. McLean should not have much difficulty in disposing of the same at a good figure.—*Critic*.

Quebec.

Operations at the Asbestos mines have been steadily carried on since our last, and the output will exceed previous years. Nearly all the output is contracted for and prices remain firm. Prices on No. 1 range from \$75 to \$80 per ton at mines.

Reports of a highly satisfactory nature continued to reach us from British and Canadian Mica and Mining Company's mines near Buckingham. Three new veins have been opened since our last issue, and these are yielding an unlimited quantity of mica of perfect transparency. One great advantage in working these valuable mines is found in the fact that all labour is carried on within the solid walls formed by the rocks, so that work is prosecuted day or night, winter or summer, with about equal advantage. Nor is there any hindrance from rain or snow, nor yet from surface drainage. Winter and summer the mine is dry. Another great economy is found in the fact that there is no heavy hauling, two horses doing all the work necessary. Mr. Key, an American miner of great experience in mica mining in the United States, has been appointed superintendent of the mines. Mr. Von Rehn, the manager, reports that his office is kept unusually busy just now filling large fall orders for home and foreign consumers.

Mr. Edward Wright has just returned from a visit to his silver mine on the Temiscamingue. A rich vein of ore has been struck and 300 tons mined. Smelting works have been erected and will shortly be in operation.

Ontario.

The annual general meeting of the shareholders of the Austin Mining company (limited) will be held at the office of the company, Ottawa, on Tuesday afternoon, 27th instant.

The work at the Bristol Iron Mines for the past month is only preparatory to a large output, and so far the work is done with a small force, pending the finishing of two of the Taylor-Langdon calcining furnaces, which are expected to be completed in six weeks, but the work of mining is nevertheless most satisfactory, for about 2,000 tons have been taken out presenting a splendid lot of ore. At present, besides sinking the shaft, three drifts are being opened out down the shaft, at a distance from each other of about 16 or 20 feet, and all through a mass of solid ore on each side. The new air compressor does its work most efficiently. Mr. Anderson, an expert from W. J. Taylor's Ore Calcining & Smelting establishment, Chester, New Jersey, is at present superintending the erection of the two furnaces, which, when completed, will roast from 80 to 90 tons per day of ore, and at a cost of not over 50 cents per ton. Mr. Anderson is surprised at seeing the quantity of ore exposed, and when it is treated

in the furnaces he is erecting will leave it a very rich ore for Bessemer steel. The ore is very easily worked with drills, as it is soft and friable. Mr. Barlow, of the Geological Survey, has recently been doing work for his department about the vicinity of the mines, and Mr. Obalski, the Quebec Government Mining Engineer, has also paid the mine a visit and proposes returning again shortly. The Bristol Mining Company propose shipping about 10,000 tons during the coming winter to Prescott or Brockville, to be forwarded to market early in spring. From 5,000 to 6,000 tons of ore are now at the pit's mouth.

This company with a capital of \$200,000 has made application to Parliament for Letters Patent of Incorporation.

Port Arthur District.

Rich ore is being taken out of the Rabbit Mountain Mine at a depth of 270 feet.

Some very rich specimens have recently been taken from the Ottawa Mining Company's location. There are no less than three veins of ample dimensions showing both native and sulphide of silver. The superficial developments so far show numerous veins well situated for mining purposes.

At the Atic Lake Mines, the property of Mr. W. A. Allan, Ottawa, a well defined vein of ore is now clearly shewn. In No. 1 shaft, which has already been sunk to a depth of over 20 feet, an assay has given 511 ounces to the ton. No. 2 shaft, three-quarters of a mile from No. 1, shews a vein carrying silver ore and native silver. There is every inclination that this will turn out a very valuable property. Silver and iron prevail throughout the entire district.

The Corporation of Port Arthur has decided to exempt from taxation a sampling mill for testing ore to be erected shortly by capitalists interested in the district.

The total value of the products of the Beaver Mine for the past two and a half months, in smelting ore and concentrates from the mill, is \$93,000. This may be relied on as being authentic.

Mr. F. A. Keefer's mining office, is daily visited by large numbers of tourists from the United States and various parts of the Dominion. Here can be seen substantial evidences of the value of the mines and mineral locations of the country, and files of local papers and mining journals with articles of interest on the resources of the district.

During the past month the mines were visited by Dr. Selwyn, Director of the Geological Survey of Canada. At this time when so much attention is being directed to the vast mineral wealth of this neighbourhood, the opinion of so eminent authority cannot fail to be of much interest to our readers; we have, therefore, no hesitation in reproducing the following excerpt from a letter written by him to Mr. T. A. Keefer, of Port Arthur :—

"As you are aware I had visited this district on two previous occasions, the last being in the autumn of 1885, when I was at the Silver Mountain mine. At that time there was not much being done and the veins had not been opened sufficiently to afford any opportunity to ascertain their true character, and I hesitated then to

say more than that the vein matter looked exceedingly promising. Now, however, I have no hesitation in expressing my conviction that this region is traversed by a great series of true fissure veins, of most promising appearance and many of which will most certainly prove of immense and permanent value.

"The features of the veins are especially well illustrated in the workings of the Beaver, the Rabbit Mountain and the Porcupine mines; but there seems no reason whatever why the numerous parallel veins which occur under precisely similar conditions, but on which at present only small openings have been made, should not develop into mines as rich as those above named and now being successfully worked. The 'New Porcupine,' the 'Silver Creek,' the 'Elgin,' and the 'Little Pig' all present most promising indications, and there are doubtless many more yet to be discovered in the large area in the district as yet almost unexplored and covered with forest and deep soil. In any case sufficient is now known to warrant the assertion that this region presents all the natural conditions for the development of an immensely valuable and extensive mining industry awaiting only the application of well directed energy and enterprise in order to secure results exceeding perhaps the most sanguine anticipations.

"As regards the ores of the mines above named and now being worked, their richness is such that it does not require to be demonstrated by assays, but the recent critical examination of the Porcupine mine ore by Mr. Brady may be referred to as particularly satisfactory, because it conclusively shows that the silver is distributed in all parts of the vein. Mr. Brady, I understand, broke samples indiscriminately from seven different places covering the length of the vein, and these separately assayed gave from 6 ozs. to 600 ozs. to the ton, and an average of the whole of 155 ozs. per ton.

"The softness of the country rock—a flat bedded, black argillite—and the generally well defined walls of the veins, make the cost of extraction comparatively small, a feature the importance of which is only fully recognized when the 'dead ground' or 'pinches,' incidental to all mineral veins, have to be traversed."

The mineral exhibit sent from the Port Arthur District to the Toronto Exhibition included iron, lead, gold, silver, copper ores, sandstone and marble; and of these the quality has proved to be of an excellent character. In common with other Canadian iron ores, the Algoma is said to be better for the making of the finer classes of iron and for the manufacture of steel than those of the American mines. Some of the samples shown assayed 68 per cent. and were remarkably free from titanium. Among the copper ore exhibits was one from the Sudbury mines, which are said to be among the richest in the world. The leadores from Mr. Duncan McEachern's location at Black Bay were exceedingly rich and carried \$20 in silver to the ton of melted ore. There were five nuggets of silver from the famous Beaver mine weighing 700 lbs., and assayed to value nearly \$2,000. One piece alone weighed 265 lbs., having a value of \$262.50. These, with other specimens from Rabbit Mountain and the Silver Mountain mines, made the largest and most valuable display of silver ore ever shown in Canada. The gold ore specimens from the Lake of the Woods country in the vicinity of Rat Portage, were said to carry a large per centage of silver. Specimens of brown sandstone and marble from Nipigon, near Port Arthur, were to be seen in the rough, dressed and polished states. The sandstone shows qualities of a high order under the most severe tests, and is claimed to be, for building purposes, superior to anything on the continent. It is to be found in seemingly inexhaustible quantities. The marble admits of a high polish, and one of the beds is said to be a mile and a-half long and thirty feet deep. The excellence of the exhibit was very much admired.

Manitoba and North-West Territories.

The property owned by the Saskatchewan Coal Mining & Transportation Company will be sold at Winnipeg by public auction on 27th

inst. It is situated at Stair Station on the line of the Canadian Pacific Railway, about eight miles west of Medicine Hat. The title to the land is under grant from the Crown direct to the company, and the land itself is sold subject to a mortgage for \$3,200, payable at any time before the 1st day of June, 1888, with interest at 7 per cent. half-yearly in the meantime. There is no incumbrance on the houses or other property. The Saskatchewan soft coal is well and favourably known in the Province of Manitoba and the North-West Territories, and a very large quantity has been taken from this mine since it was opened. The terms and conditions are 20 per cent. on the day of sale, and the balance within thirty days.

Mr. McLeod Stewart, Mayor of Ottawa and one of the proprietors of the Anthracite Mine at the Rockies, in a conversation with a representative of the REVIEW, stated that at present there were 150 men employed in the mines, and from 150 to 175 tons of coal were being turned out daily. Some delay had occurred in laying the iron rails into the different chambers of the mine, but as soon as this work was completed the company would be in a position to turn out up to 500 tons a day; in fact the capacity for producing would be almost unlimited and fully equal to any demand. No. 1 seam is 9 feet wide, 7 feet of which is solid coal. No. 2 seam, which is a six foot lead, is increasing both in width and quality of coal as the miners penetrate. Already it has been pursued 500 feet at an angle of 32 degrees. Forty-five car loads of coal are now at Port Moody awaiting shipment to San Francisco in boats. Mr. Stewart says the company will probably be able to sell on the American Pacific Coast at \$11 a ton, which is two or three dollars cheaper than American coal has been sold there for. The price has been known to be as high as \$20 a ton. As to what the people of San Francisco think of the coal, Mr. Stewart exhibited the following certificate of G. A. Luckhardt, one the best known experts along the coast: "Upon examination and special quantitative analysis of your coal marked 'Canadian Anthracite Coal Company,' from Anthracite, N.W.T., Canada, I find that the coal is what is termed a free burning Anthracite coal, averaging with Pennsylvania coal. It is a good steam coal, and excellent for house and domestic purposes, containing a little sulphur." Mr. Stewart said that while west the Hon. Thomas White had visited the mine and expressed the greatest surprise and satisfaction at the results being obtained. He had no conception the mines were so extensive, and the general outlook so good. Mr. Stewart further stated that an extensive boarding house had been erected at the mine, and that he had just shipped a large quantity of furniture from Winnipeg for fitting it up. Mr. Inglis, the former Steward of the Rideau Club, Ottawa, has been appointed manager of the boarding house. Engines and revolving screens have been ordered and will be soon in position. Mr. R. C. Luther, of Pottsville, Pa., is Consulting Engineer.

A contract has been closed with the C. P. R. company to deliver at Vancouver for the San Francisco market 1,800 tons of the Canada Anthracite Company's coal. This is regarded as the inaugural shipment to that city—others will follow in rapid succession. It is believed that a regular fleet of colliers will be established between Vancouver or Port Moody (for it is on the boards to make Port Moody the headquarters of the shipping trade) and San

Francisco and other coast cities and towns. A thorough test has been made of this coal at the request of the Government of the Dominion, and it has been found to equal many of the best and most popular brands of the Pennsylvania article. Special transportation rates have been agreed upon by both the railway and the owners of the mines at Banff.

British Columbia.

Work at the Island Mountain Mine, Barkerville, is progressing quickly. The framework for the mill has been completed at the mine, the ledge has improved greatly, and the outlook is reported cheering.

"We are pleased," writes the *Colonist*, "to learn from Big Bend that three contiguous mineral claims in that promising locality are to be thoroughly tested. The locators of these claims have entered into an agreement with some well-known capitalists by which these latter undertake to sink shafts, etc., at their sole cost for eighty days; if the result of this test should be satisfactory they will pay \$4,000 in cash and develop the mine, at their own charge, by mill and appliances; they will then be entitled to three-fifths of the property, with the option of buying the locators' remaining two-fifths for the sum of \$20,000 at any time before the 31st December, 1888. This appears to us to be an excellent arrangement and we trust it will result in the development of a highly remunerative claim."

The same authority has been informed of an extraordinary gold-bearing lode at Albert Canyon, a C.P.R. station on the Illecillewaet. The locator declares that it has a width of twelve hundred feet, and that he has had assays made giving \$15, \$16 and \$20 a ton. The pieces were in all probability picked; if the ledge will yield on an average anything like these results, the location, on account of its position on the C.P.R., will become of enormous value.

A correspondent who has lately visited the recent find of Semi-Anthracite coal in Kootenay District, referred to in another column, writes:—

"I found very good work has been done here and the results are agreeably surprising. On one seam they are in fifty-five feet, with a shaft sunk from the hanging to the foot wall, a distance of thirty-five feet. Of this there are thirty feet of solid coal without a flaw in it. Then comes a bed of five feet of coal and shale mixed. Another seam near the former has twelve feet of solid pure coal. All these seams are superposed, one above the other, at distances varying from a hundred to forty feet apart. They are all opened up, showing the hanging and foot wall. The coal appears to be much of the same quality throughout. It is of a bright black and shining appearance, hardly soils the fingers when touched and makes a brilliant clear fire, with a smoke more like wood than ordinary coal. Near the surface it is very brittle, but becomes harder further into the seam. No signs of sulphur can be detected. It is used here for the hardening of the picks and answers the purpose admirably. It lies between sandstone walls, and there are strata of clay and ironstone. These are very regular for miles around and look as though they had been ruled with lines. All now depends on the quality of the coal, there is no doubt about the quantity."

The *Colonist* understands that it is the intention of the East Wellington Coal Company to at once commence the sinking of a second shaft on their coal property at East Wellington. The second shaft will be sunk further up the valley than the present shaft, and nearer the South Wellington colliery. A line is being surveyed to connect the new shaft with the present line of railway.

The diamond drill of the Vancouver Coal Company, in charge of Mr. John Hamilton, is making very good progress. It is now down about 360 feet, and is still going down.

In the Big Bend district the placer mining on McCullough, French, Smith and Cairnes creeks had been seriously retarded by the unusually high water, but the outlook now is better than ever, and the resumption of work on a large scale in the French Creek Tunnel Company's claim, now controlled by Montreal, Toronto and New York capitalists, has done much to restore confidence on that creek. The tail-race was cleaned up last week and showed very satisfactory results. Referring again to the development of quartz ledges nothing can be done to good advantage until a good waggon road is built from the steamboat landing to the mouth of French creek, about

twenty-two miles, and a vessel put on the river.

On Wild Horse creek eighty-five Chinamen are at work. A Chinese company purchased the mining ditch for five or six thousand dollars from white men, and are now taking out \$10 per day to the man.

At Perry creek, twenty miles from Cranbrook, a company of enterprising men are endeavouring to master the obstacles to successful mining on that creek. The quicksands and slum have heretofore prevented bed-rock being reached, but it is thought that the present means adopted will overcome this.—*Colonist*.

The Perry Creek Gold Mining Company has been incorporated to work a highly auriferous bed in the vicinity of Perry Creek, Kootenay

District. The gravel of the shaft now being sunk contains everywhere coarse gold. A space of four feet square has yielded \$90 in coarse gold.

VALUABLE

Farm Lands for Sale IN MANITOBA.

2560 Acres of Splendid Prairie Farm Lands, Class 1.

The Manitoba and Northwestern Railway runs through the district in which these lands are situated.

Section 3	14	23	640 Acres.
" 15	14	23	640 "
" 17	14	23	640 "
" 19	14	23	640 "

Title direct from the Crown. Well settled districts surround these lands and good roads to them.

Terms of payment reasonable.

APPLY THIS OFFICE.

*A paper read before the American Institute of Mining Engineers, at Seranton, February, 1887.

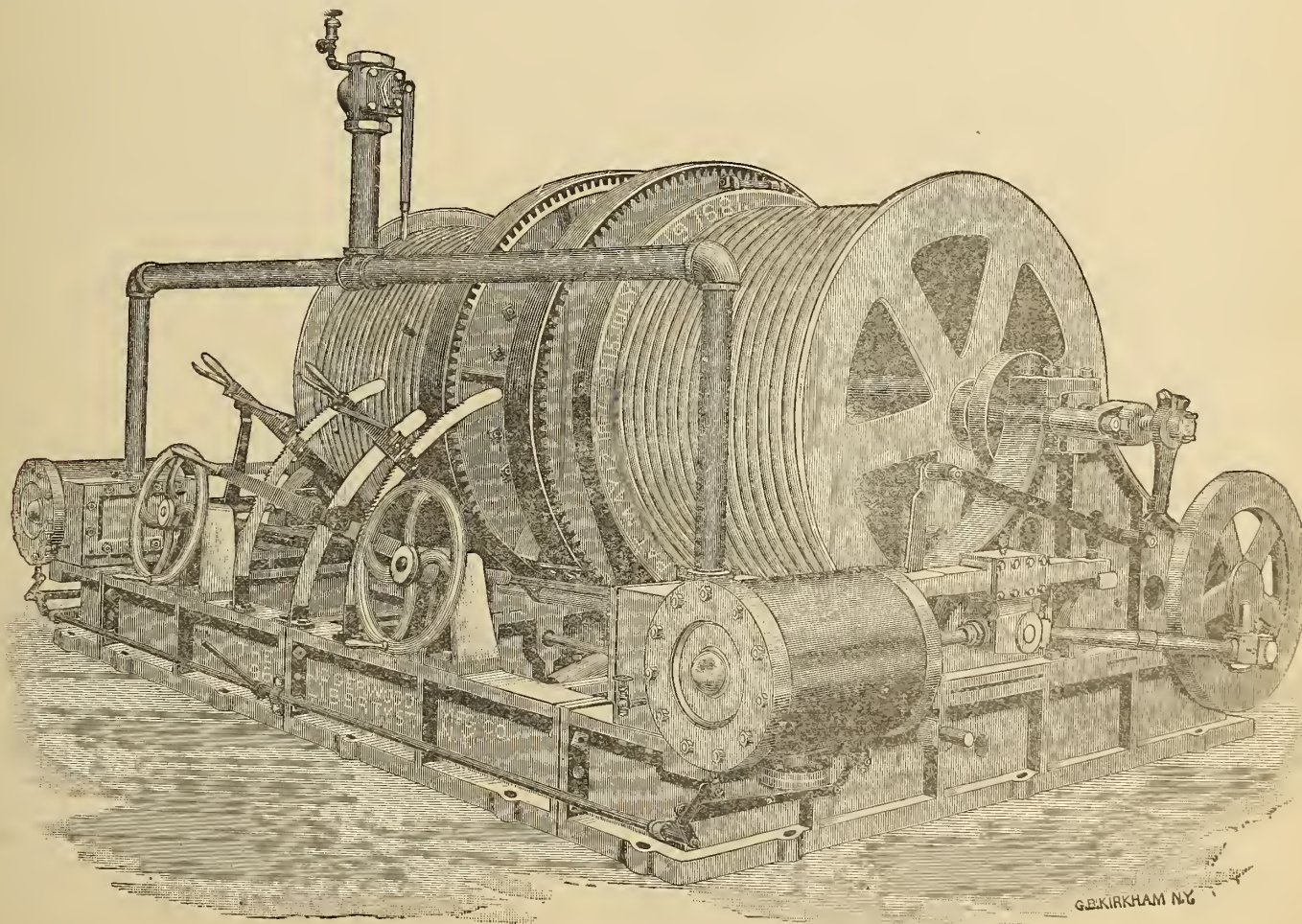
†Some coke recently obtained from the inner and older veins, lying nearest to the Cascade mountains, has

a firmness and hardness equal to that of Connellsville. My authority for this is Mr. Williamson, of Seattle—an old and experienced foundryman, who has for many years used Connellsville coke, for smelting iron.

‡Taking the cordilleran axis for our guide, the dividing line passes at its greatest northing near Behring Straits, within 23 degrees of the pole.

Lidgerwood Manufacturing Company's Hoisting Engine.

We present on this page an engraving of the Double Cylinder Reversible Link Motion Double Friction Drum and Brake Hoisting Engine, manufactured by the Lidgerwood Manufacturing Company, whose works are at Brooklyn, N.Y., and Offices and Salesrooms at 96 Liberty Street, New York. This is but one of the many styles of hoisting engines, for mining purposes, manufactured by this company, and is specially recommended for use in connection with the tail rope system, double track inclines or double compartment shafts. Both drums are loose on the drum shafts and are entirely independent of each other in operation. They may be thrown in and out of gear with the engines in motion, either separately or together, or one drum may be lowering while the other is hoisting; or both drums may be thrown into gear and the engine used as a regular reversible engine, one load being hoisted while the empty cage is being lowered.



LIDGERWOOD MANUFACTURING CO'S IMPROVED HOISTING ENGINE.

The obvious advantage of this style of engine for the tail rope system is evident, for as one drum being thrown into gear winds up the main rope, the other drum being out of gear and loose on the shaft pays out the tail rope; while, by reversing the engine, the tail rope is wound up and the main rope paid out. This is done with the minimum of friction and wear on the engines. The same independence of drum action is also very desirable at times on inclines or in mine shafts, under either of which conditions the engines will work with perfect satisfaction. In general design the engine is solid and compact, and is intended for high speed and large hoisting duty. The patent friction drums are of large diameter and spirally grooved for wire rope. They are simple, durable and effective. These engines are fitted with powerful band brakes on each drum, which are applied preferably by hand wheel and screw, or by the ordinary foot lever, if so desired.

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VALUABLE

Copper Mining Properties

— IN THE —

Eastern Townships

TOWNSHIP OF ASCOT.

- 1st. Clark Mine, Lot 11, R. 7 Ascot 187 acres
- 2nd. Sherbrooke Mine, part Lots 12 and 13,
R. 7 Township of Ascot 329 "
- 3rd. Belvidere Mine, part Lots 9 and 10, R.
9 and 10, R. 8 Ascot 292 "
- 4th. Mining Rights in same vicinity on 250 "

All of the above properties lie within $1\frac{1}{2}$ miles of the Village of Lennoxville, at the junction of the Grand Trunk, Canadian Pacific and Passumpsic Railways, and have been developed to a considerable extent, and veins opened 6 to 20 feet in width, yielding 3 to 5 per cent. of copper, also silver, and 35 to 40 per cent. of sulphur. These mines are only $2\frac{1}{2}$ to 3 miles distant from the City of Sherbrooke, and evidently are of the same class of ores found at Copelton, only four miles distant, owned and worked by the Orford Copper and Sulphur Company, and by Messrs. G. H. Nichols & Co., of New York, which have proved so remunerative.

TOWNSHIP OF ORFORD.

- 5th. Carbuncle Hill Mine, Lots 2 and 3 R. 14, and
2, 3, 4 R. 15, 718 acres. Same class of ore as is found
in the Ascot properties above described, but yielding a
higher percentage of copper.

TOWNSHIP OF CLEVELAND.

- 6th. St. Francis Mine, $\frac{1}{4}$ Lot 25 R. 12, 50 acres, with
dwelling houses, smith's shop, ore sheds and office, large
winding and pumping steam engine, with boiler, winding
and pumping gear, and about forty fathoms Cornish lift-
ing pumps complete, railway tracks, ladders, etc., situated
three miles from Grand Trunk Railway. A consider-
able amount of mining work has been done at this mine.
A well defined vein richly charged with vitreous purple
and yellow sulphurets of copper traverse the entire
length of the property, five feet in thickness, yielding 8
to 40 per cent. metallic copper.

TOWNSHIP OF GARTHBY.

- 7th. Fifty-six lots of land, 2,938 acres. This prop-
erty for the most part is unexplored, but copper is found
on the greater part of the property. On one of the lots
a vein about twenty feet in width has been found.
Samples of the ore have yielded as much as 22 per cent.
of copper, being also rich in sulphur. Other samples of
pyrites from the same property, free from copper, have
yielded as high as 48 per cent. of sulphur. The only
drawback to this property is in its distance from the
railway, it being about four miles from Garthby Station,
Quebec Central Railway. A new line is chartered,
however, which, when built, will run directly through
the property.

TOWNSHIP OF ACTON.

- 8th. The Acton Mine, 100 acres, with engine, boiler,
pumps and appliances. Within three years after this
mine was first opened it produced nearly \$500,000
worth of copper. It is situated about half a mile distant
from the stations of the Grand Trunk and South Eastern
Railways.

- 9th. Brome Mine, part Lots 2 and 3 R. 4, 50 acres.

- 10th. Bolton Mine, two miles from Eastman Station,
Waterloo & Magog Railway, 400 acres.

The above properties formerly belonged to the Can-
adian Copper and Sulphur Company, and were acquired
by the present owner at sheriff's sale, giving an indis-
putable title thereto.

The whole or any portion of the property will be
sold at reasonable prices.

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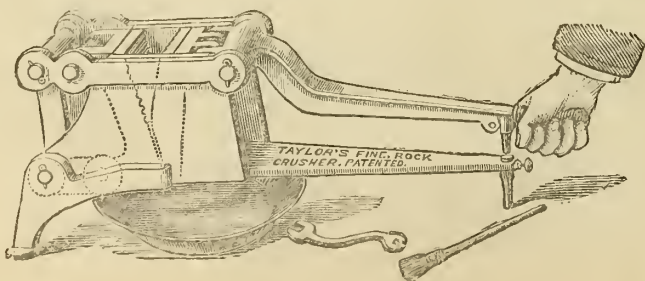
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Mineral Regulations

TO GOVERN THE DISPOSAL OF

Mineral Lands other than Coal Lands,

1886.

THESE REGULATIONS shall be applicable to all Dominion Lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, iron or other mineral deposits of economic value, with the exception of coal.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein either by surface or subterranean prospecting for mineral deposits, with a view to obtaining under the Regulations a mining location for the same but no mining location or mining claim shall be granted until the discovery of the vein, lode or deposit of mineral or metal within the limits of the location or claim.

QUARTZ MINING.

A location for mining, except for iron on veins, lodes or ledges of quartz or other rock in place, shall not exceed forty acres in area. Its length shall not be more than three times its breadth and its surface boundary shall be four straight lines, the opposite sides of which shall be parallel, except where prior locations would prevent, in which case it may be of such a shape as may be approved of by the Superintendent of Mining.

Any person having discovered a mineral deposit may obtain a mining location therefor, in the manner set forth in the Regulations which provides for the character of the survey and the marks necessary to designate the location on the ground.

When the location has been marked conformably to the requirements of the Regulations, the claimant shall within sixty days thereafter, file with the local agent in the Dominion Land Office for the district in which the location is situated, a declaration or oath setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as aforesaid; and shall, along with such declaration, pay to the said agent an entry fee of FIVE DOLLARS. The agent's receipt for such fee will be the claimant's authority to enter into possession of the location applied for.

At any time before the expiration of FIVE years from the date of his obtaining the agent's receipt it shall be open to the claimant to purchase the location on filing with the local agent proof that he has expended not less than FIVE HUNDRED DOLLARS in actual mining operations on the same; but the claimant is required, before the expiration of each of the five years, to prove that he has performed not less than ONE HUNDRED DOLLARS' worth of labor during the year in the actual development of his claim, and at the same time obtain a renewal of his location receipt, for which he is required to pay a fee of FIVE DOLLARS.

The price to be paid for a mining location shall be at the rate of FIVE DOLLARS PER ACRE, cash, and the sum of FIFTY DOLLARS extra for the survey of the same.

No more than one mining location shall be granted to any individual claimant upon the same lode or vein.

IRON.

The Minister of the Interior may grant a location for the mining of iron, not exceeding 160 acres in area which shall be bounded by north and south and east and west lines astronomically, and its breadth shall equal its length. Provided that should any person making an application purporting to be for the purpose of

mining iron thus obtain, whether in good faith or fraudulently, possession of a valuable mineral deposit other than iron, his right in such deposit shall be restricted to the area prescribed by the Regulations for other minerals, and the rest of the location shall revert to the Crown for such disposition as the Minister may direct.

The regulations also provide for the manner in which land may be acquired for milling purposes reduction works or other works incidental to mining operations.

Locations taken up prior to this date may, until the 1st of August, 1886, be re-marked and re-entered in conformity with the Regulations without payment of new fees in cases where no existing interests would thereby be prejudicially affected.

PLACER MINING.

The Regulations laid down in respect to quartz mining shall be applicable to placer mining as far as they relate to entries, entry fees, assignments, marking of localities, agents' receipts, and generally where they can be applied.

The nature and size of placer mining claims are provided for in the Regulations, including bar, dry, bench creek or hill diggings, and the RIGHTS AND DUTIES OF MINERS are fully set forth.

The Regulations apply also to

BED-ROCK FLUMES, DRAINAGE OF MINES AND DITCHES.

The GENERAL PROVISIONS of the Regulations include the interpretation of expressions used therein; how disputes shall be heard and adjudicated upon; under what circumstances miners shall be entitled to absent themselves from their locations or diggings, etc., etc.

THE SCHEDULE OF MINING REGULATIONS

Contains the forms to be observed in the drawing up of all documents such as:— "Application and affidavit of discoverer of quartz mine." "Receipt for fee paid by applicant for mining location." "Receipt for fee on extension of time for purchase of a mining location." "Patent of a mining location." "Certificate of the assignment of a mining location." "Application for grant for placer mining and affidavit of applicant." "Grant for placer mining." "Certificate of the assignment of a placer mining claim." "Grant to a bed rock flume company." "Grant for drainage." "Grant of right to divert water and construct ditches."

Since the publication, in 1884, of the Mining Regulations to govern the disposal of Dominion Mineral Lands the same have been carefully and thoroughly revised with a view to ensure ample protection to the public interests, and at the same time to encourage the prospector and miner in order that the mineral resources may be made valuable by development.

COPIES OF THE REGULATIONS MAY BE OBTAINED UPON APPLICATION TO THE DEPARTMENT OF THE INTERIOR

A. M. BURGESS,

Deputy Minister of the Interior.

LIDGERWOOD'S HOISTING ENGINES.

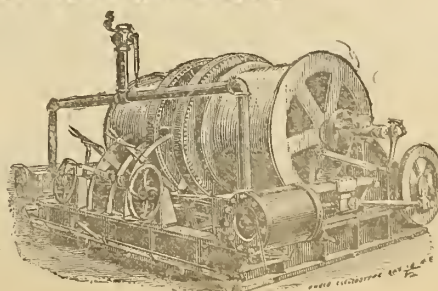
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Ten Tons Finely Ground
PURE WHITE
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APPLY AT OFFICE

CANADIAN MINING REVIEW.

A. R. WILLIAMS,

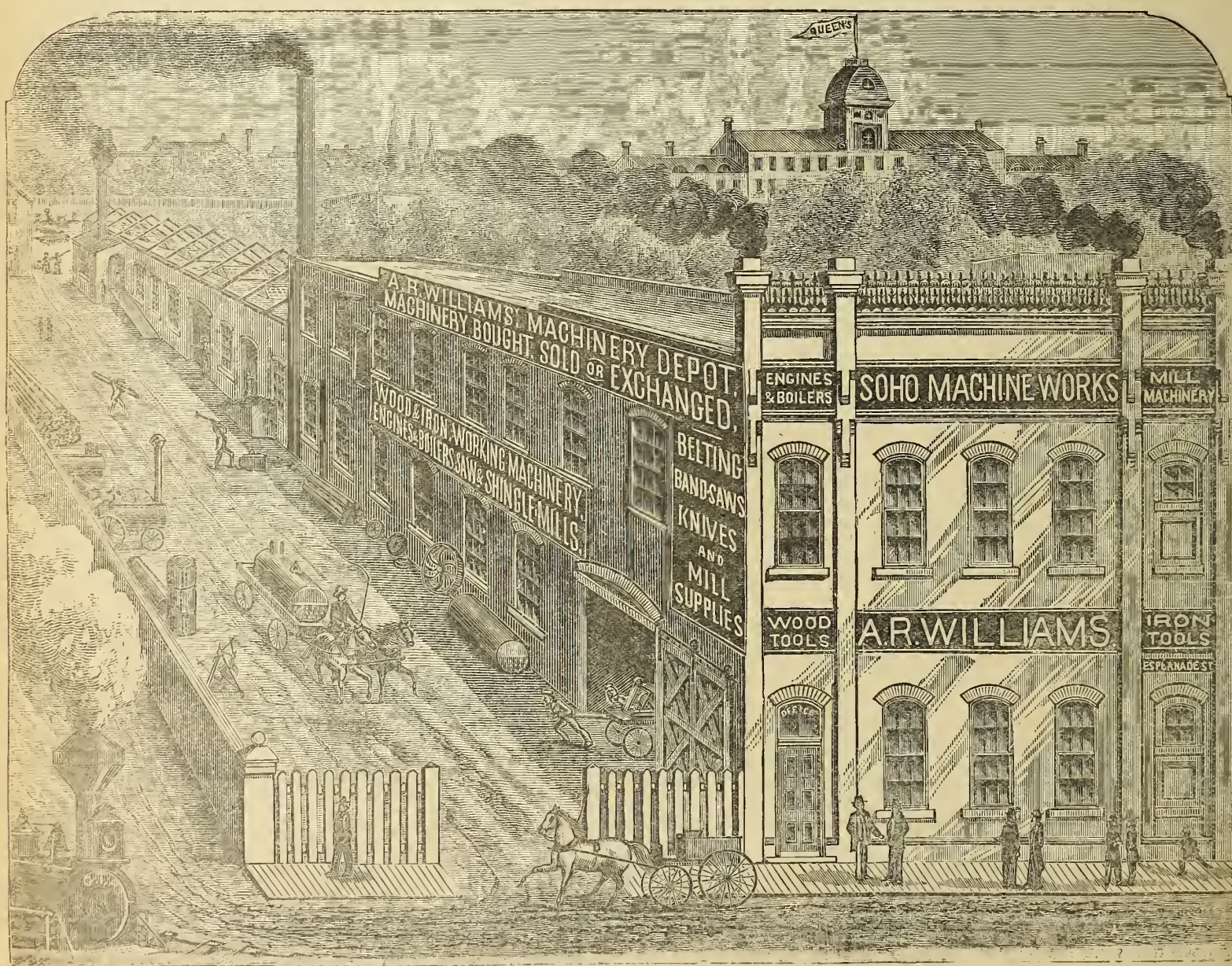
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THE Canadian Mining Review



Vol. V.—No. 8.

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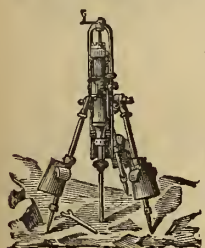
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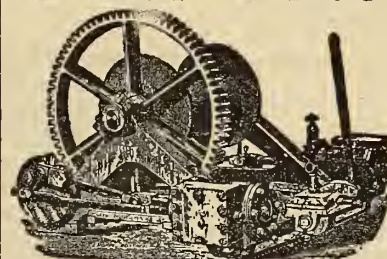
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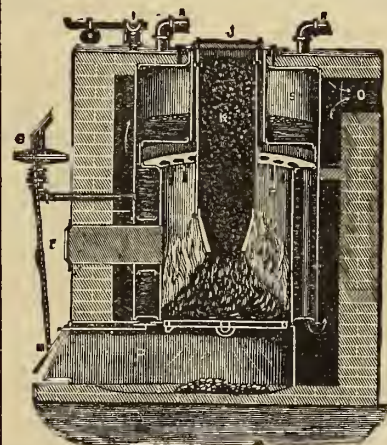
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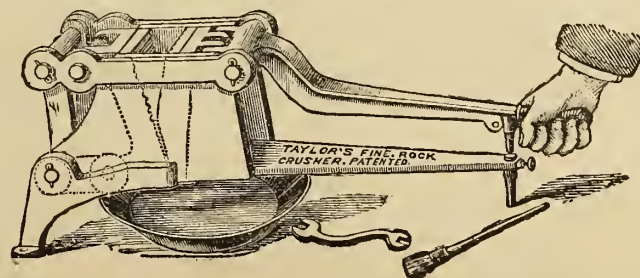
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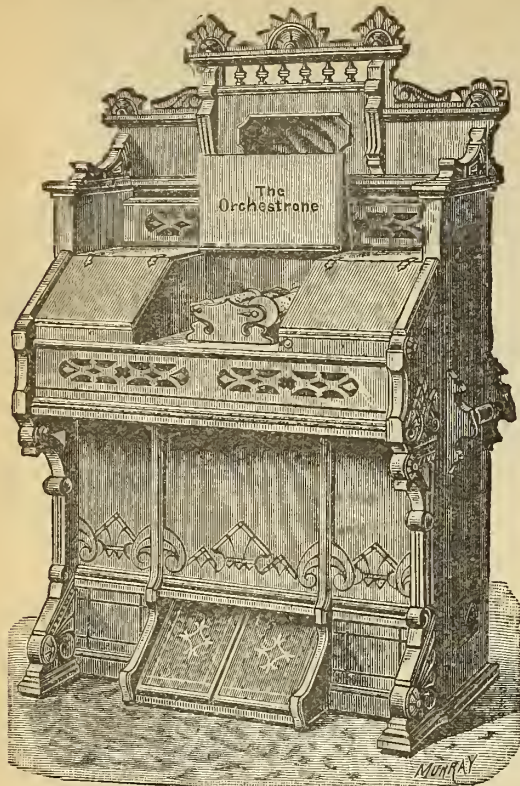
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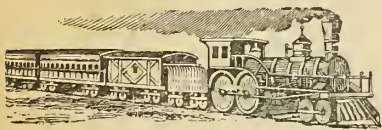
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D. POTTINGER,
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Nov. 22nd, 1886.

Department of Inland Revenue.—An Act respecting Agricultural Fertilizers.

The public is hereby notified that the provisions of the Act respecting AGRICULTURAL FERTILIZERS came into force on the 1st of January, 1886 and that all Fertilizers sold thereafter require to be sold subject to the conditions and restrictions therein contained—the main features of which are as follows:

The expression "fertilizer" means and includes all fertilizers which are sold at more than TEN DOLLARS per ton, and which contains ammonia, or its equivalent of nitrogen, or phosphoric acid.

Every manufacturer or importer of fertilizers for sale, shall, in the course of the month of January in each year, and before offering the same fertilizer for sale, transmit to the Minister of Inland Revenue, carriage paid, a sealed glass jar, containing at least two pounds of the fertilizer manufactured or imported by him, with the certificate of analysis of the same, together with an affidavit setting forth that each jar contains a fair average sample of the fertilizer manufactured or imported by him; and such sample shall be preserved by the Minister of Inland Revenue for the purpose of comparison with any sample of fertilizer which is obtained in the course of the twelve months then next ensuing from such manufacturer or importer, and which is transmitted to the chief analyst for analysis.

If the fertilizer is put up in packages, every such package intended for sale or distribution within Canada shall have the manufacturer's certificate of analysis placed upon or securely attached to each package by the manufacturer; if the fertilizer is in bags, it shall be distinctly stamped or printed upon each bag; if it is in barrels, it shall be either branded, stamped or printed upon the head of each barrel or distinctly printed upon good paper and securely pasted upon the head of each barrel, or upon a tag securely attached to the head of each barrel; if it is in bulk, the manufacturer's certificate shall be produced and a copy given to each purchaser.

No fertilizer shall be sold or offered or exposed for sale unless a certificate of

analysis and sample of the same shall have been transmitted to the Minister of Inland Revenue and the provisions of the foregoing sub-section have been complied with.

Every person who sells or offers or exposes for sale any fertilizer, in respect of which the provisions of this Act have not been complied with—or who permits a certificate of analysis to be attached to any package, bag or barrel of such fertilizer, or to be produced to the inspector, to accompany the bill of inspection of such inspector, stating that the fertilizer contains a larger percentage of the constituents mentioned in sub-section No. 11 of the Act than is contained therein—or who sells, offers or exposes for sale any fertilizer purporting to have been inspected, and which does not contain the percentage of constituents mentioned in the next preceding section—or who sells or offers or exposes for sale any fertilizer which does not contain the percentage of constituents mentioned in the manufacturer's certificate accompanying the same, shall be liable in each case to a penalty not exceeding fifty dollars for the first offence, and for each subsequent offence to a penalty not exceeding one hundred dollars. Provided always that deficiency of one per centum of the ammonia, or its equivalent of nitrogen, or of the phosphoric acid, claimed to be contained, shall not be considered as evidence of fraudulent intent.

The Act passed in the forty-seventh year of Her Majesty's reign, chaptered thirty-seven and entitled, "An Act to prevent fraud in the manufacture and sale of agricultural fertilizers," is by this Act repealed, except in regard to any offence committed against it or any prosecution or other act commenced and not concluded or completed, and any payment of money due in respect of any provision thereof.

A copy of the Act may be obtained upon application to the Department of Inland Revenue.

E. MIALL,
Commissioner.



Notice to Contractors.

SEALED TENDERS addressed to the undersigned and endorsed "Tender for Post Office at Gananoque, Ont.," will be received at this office until Thursday, the 3rd November, for the several works required in the erection of Post Office at Gananoque, Ont.

Specifications can be seen at the Department of Public Works, Ottawa, and at the office of the Collector of Customs, Gananoque, on and after Tuesday, 18th October, and tenders will not be considered unless made on form supplied and signed with actual signatures of tenderers.

An accepted bank cheque payable to the order of the Minister of Public Works, equal to five per cent. of amount of tender, must accompany each tender. This cheque will be forfeited if the party decline the contract or fail to complete the work contracted for, and will be returned in case of non-acceptance of tender.

The Department does not bind itself to accept the lowest or any tender.

By order,
A. GOBEIL,
Secretary.

Department of Public Works,
Ottawa, 13th October, 1887. }



NOTICE RESPECTING PASSPORTS.

PERSONS requiring passports from the Canadian Government should make application to this Department for the same, such application to be accompanied by the sum of four dollars, in payment of the official fee upon passports as fixed by the Governor-in-Council.

G. POWELL,
Under Secretary of State.
OTTAWA, 19th Feb., 1886.



Notice to Contractors.

SEALED TENDERS addressed to the undersigned and endorsed "Tender for Roofing," will be received at this office until Monday, the 10th October, for the several works required in connection with Copper Roofing to Main Tower of Western Departmental Building and Lead Roofing in rear of Commons and Senate Chambers, Ottawa.

Specifications can be seen at the Department of Public Works, Ottawa, on and after Monday, 3rd October, and tenders will not be considered, unless made on form supplied and signed with actual signatures of tenderers.

An accepted bank cheque, payable to the order of the Honorable the Minister of Public Works, equal to five per cent. of the amount of the tender, must accompany each tender. This cheque will be forfeited if the party decline the contract, or fail to complete the work contracted for, and will be returned in case of non-acceptance of tender.

The Department will not be bound to accept the lowest or any tender.

By order,
A. GOBEIL,
Secretary.
Department of Public Works,
Ottawa, Sept. 20th, 1887.

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The CANADIAN MINING REVIEW, is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts, as well as others interested in Canadian Mineral Lands, are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 10th of the month.

Address all correspondence, &c., to the Manager of the CANADIAN MINING REVIEW, Ottawa.

To Subscribers.

Recognising the daily increasing importance of the mining district of Port Arthur, the management have secured the services of a distinguished mining engineer, who will, from this issue, furnish our readers with authentic information as to the progress and development of these mines. Thoroughly competent correspondents have also been secured for other districts hitherto but imperfectly covered. THE REVIEW having been permanently enlarged to sixteen pages, subscribers will please note that the subscription price for 1888 has been increased to \$1.50. The management would again request that any irregularity in the delivery of subscribers' copies be at once notified to the office for correction.

Gold Assays.

The Village of Buckingham has been greatly exercised by reported discoveries of gold in the neighbourhood. A California miner who has been prospecting on a lot on the west side of the Lievre River, in the township of Buckingham, has exposed a vein of quartz about seven feet wide, and a sample said to have been taken from it has given an assay showing 42 ounces to the ton, equal to \$750. A specimen has been shown yielding a flake of gold as large as a five cent piece. Accurate samples have been taken from the vein by a prominent mine manager and submitted for assay, and the result is awaited with interest.

There appears to be considerable uncertainty about gold assays. Not only are the samples often the richest specimens obtainable, but the analysts' results are variable. Samples of quartz from the Mattawa district reported to have

given a rich percentage of ore have been re-assayed and have been pronounced to contain little or no traces of gold. Others taken from the properties of the Anglo-Canadian Phosphate Company, North Burgess, have assayed \$22, \$11, and \$5 to the ton, but subsequent trials, like those from Mattawa, gave no gold whatever. Specimens taken from a mine near Kingston yielded \$67, \$18, and nothing, in three trials, while a ten ton lot of the same ore crushed and treated at reduction works gave but \$6.00 per ton. Numerous other instances might be cited. It is evident that both samplers and chemists need both caution and instruction, and that too much credence should not be given to the first reports of gold bonanzas.

The facts of this latest discovery having been reported to one of the most eminent geologists in the United States, he remarks that the rocks of this region warrant the expectation of gold finds. He would expect it to occur chiefly in the slaty rocks or schists having small veins of quartz penetrating them. He recommends the search for gold to be made first in the streams and brooks, wherever there is running water. Two men with a crowbar and pan can prosecute the search effectively. The large stones should be pried out of the water bed, and the gravel and dirt in the bottom should be carefully washed in the pan. The result will show whether the surrounding rocks contain any gold, and, if so, search can then be made for its source.

The Calabogie Disaster.

The accident at the Calabogie Iron Mine, some particulars of which are given in another portion of THE REVIEW, is another of those disasters which urge the necessity of experienced and careful management in our mines, as well as the enforcement by legislation of a thorough system of mine inspection. We have again and again advocated that there should be some law enacted which would compel owners and superintendents to take every necessary precaution for the protection of the lives of their employees. In the absence of information as to the cause of this sad affair we refrain from further comment.

The Yukon Mines.

A few days before Dr. Dawson left on his Alaskan Survey we took occasion to refer to some very unfavourable reports then prevalent as to the richness of the minerals of this far off land. These stated that the mining, which is almost entirely placer, had been grossly exaggerated, and that food and provisions of all kind were so scarce that many of the miners had been glad to get out of the country alive. This is now corroborated by a letter to the *Colonist* signed by seven Yukon miners, who state that the reports of the country have been very highly coloured, and that the results to be gained by the venturesome spirits who have braved the perils of that long and arduous

journey to and from the mines are totally inadequate. On Dr. Dawson's return, in the course of next month, we hope to be able to furnish our readers with information as to the true state of affairs. The paragraph in another place headed "Mining in Alaska," is excerpted from a long article in the *Sitka Free Press*.

The Phosphate Market in the United States.

The increasing use of mineral manures in the Northern States warrants the belief that in the near future an extensive market for Canadian phosphate will be found in that region. Orders from Chicago and Buffalo have been received this season and many requests for samples have come from other places. As freights can be had by the returning grain vessels from Kingston to Chicago for \$1 per ton and it costs \$4.50 to take the Carolina phosphates there by rail, it is clear that the Canadian article will have a virtual monopoly of the Lake Shore region, especially as it contains about 25 per cent. more of phosphate of lime than the Carolina phosphate.

One difficulty in the extension of the use of Canadian phosphate in the United States is the inability of manufacturers to treat it in all cases with satisfaction. When it was first introduced into the United Kingdom it was found that the fluoric acid contained in it affected the workman's throat injuriously and occasioned a stench that was offensive to the neighborhood. For these reasons its use was discontinued, until after some years of experiments, these objections were obviated, and now it is used extensively both in the United Kingdom and on the continent without complaint. One of the largest manufacturers in the United States says he is deterred from its use from fear of the complaint of his workmen. But as these difficulties have been overcome abroad, there seems no reason to suppose that they cannot be met successfully on this continent. If any manufacturer desires to know better how to treat this article we are able to place them in communication with one of the most experienced makers of superphosphate in England who would cheerfully give them information.

An Odious Comparison.

Having in recent issues looked into the question of our Geological Surveys and their relation to the Provincial Revenue, we now come to the consideration of the benefits actually derived by the several provinces of the Dominion from this indispensable branch of Government work.

Nova Scotia and British Columbia reserve the minerals for the use of the mining section of the population, and publish annual reports of the industry, and have each a Minister of Mines as a necessary result of so wise a course; while in Ontario and Quebec, the mining laws are such that only a very small revenue is derived from this source. In Ontario, wholly from sales, while in Quebec sales and royalty on

gold, to a small extent, which is more than balanced by expenditure in police! From the accounts of the provinces named, from 1880 to 1886, the following is given as the revenue and expenditure under this branch of service:

Nova Scotia.

Year.	Revenue.	Expenses.
1880.....	\$ 49,294.11	\$ 6,000.00
1881.....	70,602.82	6,638.79
1882.....	101,768.28	10,161.90
1883.....	108,977.84	10,785.36
1884.....	122,024.20	10,000.00
1885.....	100,692.50	10,720.75
1886.....	119,367.03	10,538.05
Total.....	\$672,726.78	\$64,844.85

British Columbia.

Year.	Revenue.	Expenses of Provincial Secretary and Minister of Mines.
1880.....	\$18,906.50	.....
1881.....	43,813.60	.....
1882.....	46,098.70	.....
1883.....	38,197.75	.....
1884.....	32,652.50	.....
1885.....	37,642.60	.....
1886.....	70,500.00	\$13,390.00
Total.....	\$287,811.65	\$13,390.00

Ontario.

Revenue from Sale of Mining Lands in Unsurveyed Territory.

1880.....	\$ 938.98
1881.....	120.00
1882.....	1,820.00
1883.....	12,073.00
1884.....	12,213.00
1885.....	3,551.00
1886.....	9,023.00
Total.....	\$39,738.98

Quebec.

Year.	Sales, Woods and Forests.	Revenue from Gold Royalty.	Expenses of Collecting Royalty and Police.
1881.....		\$ 893.00	\$ 432.30
	Mineral Lands fines	145.30	
1882.....	7,905.85	2,908.00	3,133.57
1883.....	15,907.48	1,620.00	4,037.30
1884.....	27,012.15	1,000.02	4,926.02
	Mineral Land Sales		
1885.....	1,966.60	525.00	4,078.53
Total..	\$52,792.08	\$7,091.32	\$16,607.72

Recapitulation.

	Average Annual Revenue from	Average Annual Expenditure.
Nova Scotia—Rent or Royalty.....	\$96,103.82	\$9,263.55
British Columbia—Rent or Royalty.....	41,114.52	say 10,000.00
Ontario—sales.....	5,676.99	no figures given
Quebec—sales.....	13,198.02	3,321.54
Average royalty.....	\$1,418.26	

It is, therefore, apparent that Nova Scotia has an average annual income from royalty or rent of minerals equal to \$96,103, collected at a cost of \$9,263, and British Columbia also receives yearly from rent or royalty \$41,114, at a cost of say \$10,000, while in Ontario and Quebec the mining interests are so mismanaged that little or no revenue is derived from rent or royalty, but the future welfare of the mining industry is sold unconditionally to speculators and farmers by the Local Legislators of the last mentioned provinces, "having no care for the future and letting the future of the mineral wealth of these provinces take care of itself."

The Mowat administration has a supreme contempt for "Old Tomorrow," and does not lay up treasure in the development of the mines and minerals of the country, although the Hon. Mr. Pardee writes an annual report in glowing colours of the great mineral wealth of the province, but sells as mining lands for a small sum to such of his unbelieving friends as do lay up treasure in the unconditional ownership of the miner's portion. What must our admiration be of his glowing reports which describe unbounded mineral wealth while no means are taken to make it a source of provincial revenue or advancement, but as is proved by the figures and doings of that department, this is placed in the hands of those who are party friends or agents, and held in reserve for these party agents even when applied for by prospectors and explorers? Hence the necessity for the location of a mineral discovery on the ground by the discoverer and then in the Land Office, and thereby avoiding the present legalized system of abuse—we had almost used a stronger term. The Hon. Mr. Pardee does not even condescend to state how much is actually received from mining land sales, except those in unsurveyed territory. Why is he ashamed to do this? Does he dread the exposure of the names and thousands of acres of mineral lands held by political friends possessing the special qualification of calling themselves "Reformers," but whose principal "reform" is to appropriate legally under the present unjust system of granting mining lands, the hard earned labour of such unfortunate explorers or prospectors as fall into the trap laid for the innocent and unsuspecting. Nor yet is the hon. gentleman content with writing a glowing mining report, but he has special agents. It would be interesting to know what the qualifications and remunerations are of these employees of the Ontario Crown Lands Office. Do they consist in *slaughtering* the interests of prospectors and miners who desire to earn an honest living? or of *sticking* and *bleeding* capital due to early trade experience which shows a strong hereditary tendency to develop, or *butchering* a good mining prospect? Or *fleeing* a good mining company which has to pay for errors and blunders due to ignorance or inexperience in the business? Does the Mowat Government do such an agent justice if they merely print a very self-interested report, and can such an expenditure of personal advertising be considered a wise expenditure of the people's money? We regret, exceedingly, the state of the Hon. Mr. Pardee's health, and trust that for his own sake and the good of the mining interests of the province he will retire into the sweet shades of private seclusion where he will better aid by his absence from office the interests of the mining community, and we sincerely trust that his successor will not encourage the present system of locking up large sections of our mining lands for party friends and special agents or reporters on mining matters.

In the Province of Quebec the condition of the mining laws is equally unsatisfactory with that of Ontario, and it is to be hoped that the present Government will consider this matter at least from a point of self-preservation if not from the higher motive of the greatest good for the largest section of the community, and not in the special interests of a few partisans as is the case in Ontario. In the report for 1880-81 it is stated "The Quebec General Mining Act was sanctioned on the 24th July, 1880, and consequently was not in force during the whole of the period embraced by the present report. However, during the short space of time which has elapsed, it has already begun to produce the two-fold effect which the Legislature had in view in adopting it namely, increasing the revenue and more especially developing the mining resources of the country. In proof of this statement I have but to refer to the figures given above and to the statement annexed hereto."

In 1885, however, the mineral land sales only amounted to \$1,966.60, so that the speculation in mineral lots was not even benefitted by the Quebec General Mining Act, as was expected. The craze for speculating in phosphate lands during 1882, 1883 and 1884 having collapsed in 1885, and in the report for that year it is stated that "a sum of \$525 for mining licenses was levied on the parties engaged in mining. The corps of police employed to collect these fees and maintain order in the Chaudiere mining division cost the province \$4,078 53!" When such is the state of affairs in Ontario and Quebec, is it not time that the example of the sister provinces of Nova Scotia and British Columbia was introduced? Mining statistics we hold to be within the supervision of the respective provinces, and is only a little closer related to geological work than is the agricultural industry, and if so why not open experimental mines for the development of the mining industry in new or unproved districts with free or convict labour?

Ground Phosphate.

A conviction of the utility of the application of crude phosphate to the soil is steadily gaining way. Experiments with Canadian phosphate at Newport during the past season have shown a marked effect upon grape vines in hot houses, and its effect upon garden plants has been established beyond dispute. Many small manufacturers are glad to get the ore in the pulverized state for treatment with acid, and there seems to be much encouragement for the erection of grinding mills.

The mills at the Basin du Lievre have been kept busily at work and a shipment of 300 tons of the ground ore has been made to Hull, England. In the future it is probable that the high grade ore will be selected for shipment abroad in the crude state and all the low grade ore will be ground and raised in quality by

freeing it from mica and other impurities. The market for this will be found in the United States and Canada. More active exertions ought to be made by the Department of Agriculture and the Geological Survey to impress upon farmers the desirability of using phosphatic manures.

It is thought that Kingston affords a favorable site for the erection of phosphate grinding mills. Coal can be had cheaply there and the phosphate can be brought to it at low rates by the Rideau Canal and exported as ballast in the lake schooners. It is likely that this enterprise will be undertaken before long and will have a marked effect in stimulating the phosphate industry.

On Some Canadian Minerals.

By B. J. Harrington, B.A., Ph.D., F.G.S.*

I.—SODALITE.

The mineral sodalite, though not the only silicate containing chlorine, is interesting on account of the considerable proportion of that element which it holds. Its occurrence in Canada was first noticed by Dr. Hunt, who, many years ago, detected it in small quantity in the nepheline-syenite (*granitoid trachyte* of Hunt) of Brome Mountain. Subsequently it was found by the writer in some of the nepheline-syenites of Montreal and Belœil, and more recently it has been discovered by Dr. G. M. Dawson, on the Ice River, a branch of the Beaver Foot River, near Kicking Horse Pass, in the Rocky Mountains.

The mineral from Montreal was described by the writer in 1875, and lately that from the Rocky Mountains has been examined. In both cases the results of analysis agree closely with the formula $3\text{Na}_2\text{Al}_2\text{Si}_2\text{O}_8 + 2\text{NaCl}$, and are as follows:—

CONSTITUENTS.	Montreal.	Ice River.	Formula.
Silica.....	37.52	37.50	37.1
Alumina.....	31.38	31.82	31.7
Ferric oxide.....	tr.	0.01	....
Lime.....	0.35	....	....
Magnesia.....	tr.	....	....
Soda.....	19.12	19.34	19.2
Potash.....	0.78	0.27	....
Sodium.....	4.48	4.61	4.7
Chlorine.....	6.91	7.12	7.3
Total.....	100.54	100.67	100.0
Specific Gravity.	2.220	2.293	....

Both varieties are of a fine blue colour, and that from the Rocky Mountains might be employed for the purposes of jewelry. A very beautiful polished specimen of it may be seen in the museum of the Geological Survey at Ottawa. The hardness in each case is 5.5.

The rocks in which the sodalite occur require further study. One of them is a nepheline-syenite, closely resembling, both macroscopically and microscopically, some of those found near Montreal, whilst another, in which the sodalite appears to be most abundant, is a grey gneiss-like rock containing a great deal of quartz, and possibly fragmental.

II.—HURONITE.

The name "Huronite" was long ago given by Dr. Thomson, of Glasgow, to a mineral which was found in a boulder of diabase on Drummond Island, in Lake Huron, and which was sent to him by the late Dr. Holmes, of Montreal. Thomson regarded it as a new species and

published a description and analysis of it in his "Mineralogy" in 1836.

Dana, in his "Mineralogy," speaks of it as "an impure anorthite-like feldspar," but also includes it with fahnlunite, on the authority of Hunt. Its true affinities are evidently with the feldspars, and it may be looked upon as an impure or altered form of anorthite. One of the original specimens from Drummond Island is in the Holmes collection at McGill College, and an examination of this shows that Thomson's description is in several respects incorrect. The hardness, for example, is about $5\frac{1}{2}$ instead of $3\frac{1}{4}$, as stated by Thomson. Instead of being infusible, it is distinctly fusible (F about 5), while it contains alkalies, the presence of which is entirely ignored by Thomson.

As we have seen, the mineral from Drummond Island was found in boulders, and the origin of these was not known. About two years ago, however, an exactly similar material was discovered *in situ* by Dr. Girdwood near Sudbury, Ontario, where it occurs in rounded or somewhat angular masses in a dark green dyke of diabase, possibly the source of the boulders on Drummond Island. The Sudbury mineral, like that from Drummond Island, is of a light yellowish green colour, shows somewhat indistinct cleavage, and in places, faint striae, which are probably due to multiple twinning. It is translucent on the edges, and has a rather waxy lustre. The hardness is $5\frac{1}{2}$, or a little over, fusibility about 5, and specific gravity 2.814. Under the microscope, thin sections give evidence of considerable alteration, but with polarized light, the banding due to twinning can be seen in places. An analysis made by Mr. Nevil N. Evans, chemical assistant in the laboratory of McGill College, is given under I., while Thomson's is given under II.—

CONSTITUENTS.	I.	II.
Silica.....	47.07	45.80
Alumina.....	32.49	33.92
Ferric Oxide.....	0.97	FeO 4.32
Lime.....	13.30	8.04
Magnesia.....	0.22	1.72
Potash.....	2.88	.....
Soda.....	2.03	.....
Loss on ignition.....	2.72	4.16
Total.....	101.68	97.96

Specific gravity..... 2.814 2.8625

The rock in both cases is a true diabase, although that examined by Thompson was supposed by him to be hornblende. In each case, the microscope shows the presence of augite, a green chloritic mineral, titanite iron ore, and a more or less decomposed plagioclase, the altered portions of which are probably identical with the so-called "huronite."

III.—APATITE.

Though much has been written with regard to Canadian apatite, little attention seems to have been paid to its crystalline form. In so far as the writer's observation goes, the crystals of most common occurrence consist simply of a combination of the hexagonal prism and pyramid (∞ P.P.) A large proportion of the crystals from Renfrew County, however,

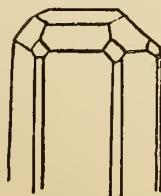


exhibit the end-face in combination with the above forms, and resemble the well-known crystals from Snarum in Norway. More rarely,

the Renfrew crystals have their vertical edges truncated by the prism of the second order, ∞ P2,† while in a few cases, which have recently come under the writer's notice, a pyramid of the second order (2P2) is also present, the full combination in this case being, as shown in the accompanying drawing, ∞ P. P. 0P. 2P2. ∞ P2.

Mining Developments on the North-western Pacific Coast, and their Wider Bearing.

By Amos Bowman, M.E.

Continued from September number.

Gold-Bearing Rocks.—The gold region of Cariboo, one of earliest notable placer-fields discovered, and one of the most profitably worked after California, possesses many characteristics in common with California and Colorado, a few of which I will mention. Though it was the placer-deposits which first attracted attention, they were due to underlying quartz veins and to the country-rock, which was slate. The miners of 1858-61 scoured the plateau for "slate countries;" and they were rather fastidious about the kind of slate; it must be like that of California. I have frequently found the miners most excellent geologists within the limits of their knowledge. Now those slates containing the auriferous deposits were deep-water sediments, antedating the coal, and experienced squeezing, and then baking, and are at last broken, or cracked in places, while the coal-making was still going on. In Cariboo, they were underlain by a limestone formation of Palæozoic age, containing fossils, and are much older in date of original deposit than those of California, which have been determined by its State geologist to be Triassic. In California, however, the fossiliferous rocks were very limited in area, and apparently lying in narrow belts, which may have been folded along with some non-fossiliferous Carboniferous or older rocks of the same slaty structure, such as are known to exist on the flanks of the Sierra; so that the evidences of their Palæozoic age, in part, may yet be forthcoming.

But the crumpling, and the quartz-forming, or filling-in process, was simultaneous with that in California. We know this because we have found in Cariboo, Cretaceous rocks containing fossils of the Shasta group, which tell the story of the uplift, as it does in California.

What there may have been in this deep-water sediment and its underlying (deeper water?) limestone deposits, to give origin to a great abundance of auriferous pyrites, with accompanying free gold, would be hard to say. But we get a little light when we study it in connection with other things. The uplift generated older volcanic outflows of Neocomian age, along with which there must have been a great deal of solfataric action. In British Columbia the older volcanic traps are bedded, and cover considerable areas, while in the gold region of California I have seen them only in the form of dykes.

Enrichment and its Consequences.—Beside the solfataric action, the proximity of the slates to crystalline rocks—commonly best seen in the flanges of the plateau—and time, may have had a good deal to do with the enrichment of the slates. Whatever may account for their enrichment, beyond the causes mentioned, these deep-water sediments lying along the great plateau-chain in America, Asia and Africa, constitute a study in physical geology as well as in gold mining, worthy of the attention of

the best observers. Since the conditions of its wealth in precious metals appear to be similar throughout the statesman is no less interested, for where the precious metals are found in quantity, judging the future by the past, there the prospector, the capitalist and the immigrant will *some day* congregate in mass.

Northern Conditions.—What I have just said, having a general bearing, leads me back to my particular field of Cariboo, in the same connection. Theories have been constructed to account for a supposed inferiority of mineral wealth along the plateau in northern latitudes. Some have imagined that volcanic action was lacking in the north, or that when we get far enough north, the colder climatic conditions might have hindered the favourable chemical action under ground. Others have simply enunciated the theory, as based upon fact, that the moment we cross the boundary line into Canada the happy things of nature no longer happen.

But theories are unnecessary, because the supposed facts are not facts. Cariboo has yielded \$30,000,000, chiefly from a few miles of placer-diggings on two creeks, Lightning and Williams creeks. Omineca and Cassiar, in latitude 55° to 57°, have told their story in gold-dust; and many million dollars have been extracted where the working season is only two months in the year; where the auriferous gravel has to be thawed with fires out of an ice conglomerate in which it has been bedded since the Glacial period. Little by little the explorers have continued following the plateau northward, until at the present time they are prospering under the Arctic circle. There is a flourishing placer-mining camp on Stewart River at the headwaters of the Yukon.

PLACER DEPOSITS.—I have cited these localities in evidence of mineral wealth in the rock. I will now direct attention to the placer-deposits, which are as much more interesting to us, in most respects, as they are nearer to us in time of formation.

Three circumstances have to combine favourably, to make a good placer-mining region: First, the veins must carry free gold along with the baser metals; secondly, the conditions of natural concentration in streams must have operated upon them; and thirdly, after such operation, the product must be accessible to the miner. Either of the last two conditions wanting, though we walked over untold millions, we could not realize it through placer-mining. In California all three of these purely geological considerations happened to be superb. In British Columbia they are not exactly identical, nor are they the same in different parts.

Physiographical Comparisons.—The position of Cariboo in relation to the cordilleran aggregate corresponds with the higher portion of the drainage-basins of the Columbia, the Snake, and the Colorado rivers, within the western flange, while California is outside. In the raising of the plateau accordingly, the two areas were subjected to different degrees of movement, different influences in the matter of successive rest and re-elevation or depression, and possibly even to opposite movements. Certain leading facts, however, are alike in both regions. The streams of the northern plateau experienced the same period of erosion in the early Tertiary, as those of the south, including California outside of the western flange. Again, the Miocene brown coals of the northern plateau found the necessary conditions of growth and deposit at the close of the eroding period contemporaneously with the brown coals of Ione and Lincoln

in California. Again, in the Miocene and Pliocene periods there followed a silting-up of the old eroded rivers in the northern interior, just as we have found them in California. And lastly, the Tertiary was concluded by volcanic outflows in both places.

Silted Channels—The Cause.—The most important feature of a placer-mining region, which I have barely hinted at as among the favourable conditions, is this filling of the old eroded canons as a means of arresting the gold. It was accomplished pretty much at the same time, and in the same way, everywhere along the great cordilleran region, so far as I have had the opportunity to observe.

The silting-up was due to an alteration in the transporting power of running water, involving a different combination of its two factors of volume and grade. Professor Whitney attributes all to a change in volume, and Professor Le Conte all to a change in grade. Without discussing the amounts of depression and re-elevation experienced by those two different parts of the cordilleran region during the placer filling, and the present eroding period, which is a very interesting one, I will simply bear testimony to two facts bearing on the subject, viz:

1. At the outlets of the auriferous mountain streams of Cariboo district, we see them debouching upon the plains of the interior plateau, and underneath the surface in disconnected basins, a Miocene brown coal. Overlying the brown coal are seen bluffs of still-water bedded gravels, blending into the stream-bedded gravels, of the gold region. The gravels of the silting-period were dumped into standing water, which ran horizontally along the base of the mountains, not less than 100 miles, and vertically not less than 600 feet above the general level.

2. At the out-lets of the auriferous streams of the Sierra Nevada they are seen debouching upon the plains of the Sacramento, holding under the surface the brown coals already mentioned; while at Table Mountain, in Butte County, they are seen to have dumped their silts and gravels into standing water, at not less than 600 feet above the present sea level.

There was thus, at least, a change of grade, as one of the factors of the transporting power of water. To this change of grade, if not to an absolute uplift, I would especially direct the attention of experts, as an important consideration, in looking up and down the cordillera at the auriferous deposits which may call for their examination.

The Modern Streams—A Divergence.—I have now an interesting divergence to note, in the physical history of the rivers of the northern interior plateau, from the conditions obtaining in California. It is true, the resemblance of conditions continues to hold further, in the fact that the lower Sacramento River runs entirely in silt, as also does the lower Fraser. So does the Fraser above the bed-rock canon, where it passes through the coast or Cascade Mountains. When we reached the headwaters of the Fraser, on which Cariboo is situated, the gold-bearing stream-beds are seen to have been filled like those in California; the waters at the *debouchure* have also subsided, and the modern streams have cut fresh canons, which are, for the most part, identical with the old, as they are in California. But the new erosions have not gone down to the bottom of the older canons, as they have in California. From 50 to 150 feet of the richest auriferous deposit is found underneath the stream-beds. All the rich placers of Cariboo have been mined by underground drifting, with all the difficulties of water and "slum" to contend with overhead. In

California, on the contrary, the modern streams have cut down at mid-slope a thousand feet deeper than the Tertiary streams preceding them had done.

All the difficulties in the way of the placer-miner are accordingly multiplied, on the northern plateau at least; and while I am not prepared to say, of my own knowledge, how it is in other portions of the plateau, I think it may be found the case generally within the eastern and western rims.



An Improvement.

Toronto, 30th Sept., 1887.

The Editor

THE CANADIAN MINING REVIEW:

SIR,—May I suggest that if your paper was *paged continuously*, as periodicals generally are, so that they may be bound and *indexed* for reference, it would be much more useful, to us at least. When we first subscribed for the REVIEW, I ordered the back numbers in order to have the full series bound (as I thought it would constitute a good history of mining in this province), and I was much disappointed to find that each number was paged separately. I have kept all the back numbers still, hoping that you would soon adopt the paging I have indicated.

Please excuse this suggestion if it does not meet your views.

SUBSCRIBER.

[The improvement suggested by our Toronto Subscriber is one which has been kept in view since the management of the REVIEW came into our hands. The change will be made commencing January issue, 1888.—*Edit.*]

Theory and Practice.

Brandon, October 4th, 1887.

The Editor

THE CANADIAN MINING REVIEW:

SIR,—

The theoretical geologist is he who studies the nature of geological phenomena in the laboratory and constructs doubtful solutions of the order of rock formations according to known chemical formula with an exactness due to the precision with which chemical reactions take place. The correspondent to a mining journal who dares to trespass on the elucidation of a geological problem is in much the same position, both are guilty of entering on ground which belongs to the Field or Practical geologist, who has examined the district and strata in question. Being of a practical turn of mind at present, I consider this apology necessary to geologists for the liberty here taken.

The southern portion of the Province of Manitoba is, according to United States and Canadian geologists, underlain by strata of Trenton age that is holding Trenton fossils which again is overlaid or capped by Cretaceous rocks. It has been proved by numerous drillings made in several parts of Ohio that the rock underlying a gas or oil producing region is Trenton limestone, over this is required a thickness of several hundred feet of strata so as to form a natural reservoir, as it were, to store or keep the oil and gas there generated, from such bituminous or animal remains as have been imbedded in what was once the bottom of

the Silurian sea, and now called the Trenton strata. The Cretaceous rocks form such a covering. The Manitoba limestone has not, however, the bituminous (oily or gaseous) shaley associations or look of the Trenton limestone, although the fossils, which by their presence and death there in ages past, are the cause or source of the gas or oil in the Trenton limestone are identical with those of the Manitoba limestone, this fact proves it to be of Trenton age. Is there or is there not an oil or gas producing area in Manitoba? By drilling through the Cretaceous strata till the Trenton is reached will the problem be solved. The question is one of such importance that its solution by a sufficient amount of drilling in Manitoba is a matter worthy of consideration. Here again is another matter for thought: ought not all Hydro Carbons, gaseous or fluid, as well as coal, lignite, soft, or anthracite be reserved in selling land to farmers? In what way can a farmer be entitled to receive as a gift a seam of salt, rock, or natural reserve of fuel 1,500 or 2,000 feet under his land, and of the existence of which he is ignorant? Salt or mineral springs may be reserved for health's sake, but the time once was when the salt of the earth was considered as valuable as the salt in the water. A very small royalty on such minerals would pay or compensate the Government for any outlay it might incur in the solution of questions such as this and possibly yield revenue, but more especially in a part where the liquidation of debt from Bonds would fluctuate any dryness there might be in the Provincial exchequer.

BRANDON.

The Gold and Silver Mining District Ouray County, Colorado.

Lennoxville, P.Q., 6th Oct., 1887.

The Editor

THE CANADIAN MINING REVIEW:

SIR,—Having just returned from the above named district I have pleasure in sending you a concise account of Ouray and the surrounding district as it may be of interest to some of your readers.

Now that the Denver and Rio Grande railroad is rapidly approaching this lovely mountain town of Ouray, it being only eight miles distant, its beauties will be made accessible to the travelling public. Ouray is the county seat of the county of the same name, and named after Ouray, Chief of the "Uncompahgre Utes"—or Indians. Uncompahgre means the "valley of Fountains," and in the town site of Ouray, and in the valleys below, there are numerous very large 'hot springs' which gush from the earth, and this fact is said to have given rise to the name.

Approaching Ouray by a well travelled toll road from the outer world, you pass through a level park traversed by the Uncompahgre river. It is about 10 miles in length and from one to one and a-half miles in width. At the lower end, close to the road, are some very large hot springs, the temperature of whose waters nearly reaches a boiling point, and are impregnated with iron, salt, lime and the alkalies. This park is bordered on the west side by a straight line of cliffs of sandstone, capped with volcanic rocks, gradually decreasing in height toward the north, and in the east by slopes more or less steep, from the "Uncompahgre Peak" group and its spurs. On either side of the road, as you drive through the park to Ouray, are flourishing farms, and the stream towards Ouray is well wooded with popular, pine, elder and willow.

Within about two miles of Ouray this park narrows into a magnificent gorge, bounded on the east side by precipitous cliffs of sandstone (of the lower Carboniferous formation), and sloping backward from the edge are dense forests of pine and aspen timber, the whole crowned by serriced peaks and truncated masses of grey trachyte, the summits of these peaks being from 3,000 feet to 4,000 feet above the valley, and from 10,000 feet to 14,000 feet above tide water. From this gorge you emerge into the beautiful amphitheatre in which stands the town of Ouray.

In the SW portion of the basin, in which stands the town, and where the waters of Cannon creek flow into those of the Uncompahgre, there are some lovely canons and picturesque gorges; and here, in places where the hot springs flow down over the banks into the main stream, the rocks are covered with a perfect mat of "maiden hair" and other ferns. A short distance from here, up Cannon creek, is a large cave, the floor and roof are covered with stalactites and stalagmites.

On the north side, and where you emerge from the gorge into the basin where stands the town, are almost perpendicular cliffs of the old red sandstone, these partially encircle the town, while around the other portion the hills are more sloping and covered with pine timber of various kinds. I estimate the average height, or rather thickness, of this sedimentary formation to be 800 feet; above this is the layer of trachyte or volcanic rock of an average thickness in this district of about 3000 feet to 5000 feet.

On the south of the town is a stratum of sandstone, and in the southwestern portion of the town limits, where are located several mines, the lodes have for their walls so-called quartzite, or really altered sandstone, their ores being contained in a gangue or matrix of quartz property. There is also here a stratum of ribbon jasper, also conglomerates in the shape of both pudding stone and breccia. The effect of heat in metamorphosing the sedimentary rocks is here shewn in a very marked manner.

Leaving Ouray at the south side, you ascend the picturesque and heavily wooded gorge of Canon Creek towards Sneffels and Virginus Basin, in which are located most of the celebrated mines of Sneffels district. About 3½ miles from town, and about 1,000 feet above it, you see the last of the red sandstone where the creek has cut through it, and you are now between walls of trachyte, the sheer bluffs on the east side stretching upwards in an almost perpendicular line for almost 1,000 feet. The west side is more broken and sloping. From this point of junction of the sedimentary and igneous rock to the summit of the highest peaks the trachyte prevails.

Professor Hayden, of the Geological Survey, claims this trachyte as No. 4, or the youngest of the four groups of trachyte rock. He says: "This group horizontally, is a restricted one, but fraught with occurrences of the highest interest. not only are the rocks themselves of very peculiar type for the position they occupy, but the presence of many metaliferous veins, lends additional importance to the group. Some of the highest mountains of the region are partly or wholly composed of it. The latest discoveries of ore-bearing veins seem to have been made at localities where the group occurs as merely capping the older ones. In other words instead of the vein being confined to No. 4, they extend through it, and can be reached in older formation." Speaking of these lodes, nearly all are found in trachyte No. 4. Sub-

sequent investigations have shown that they penetrate beyond the limits of this group, and without any appreciable change of course or character, enter the metamorphics which are covered by the trachytes. All the veins, located within the trachyte, which I had occasion to visit, were argentiferous, although it must be understood some of the lodes also carry gold.

South east of Ouray, is Red Mountain Park, which is distant about 10 miles. In this park, at the upper end, are some brilliant scarlet peaks. They are due to admixture of certain mineral substances, originally white, the presence of ferric oxygen compounds gradually changes this colour to yellow, red and brown.

The rock is a crystalline feldspathic paste of white colour, containing very minute transparent crystals of sanidite and small crystals of pyrite. Decomposition of pyrite releases the sulphur and changes the iron from a bi-sulphide to hydrates seaquioxide. This in varying percentages, produces the colours and shades above enumerated.

In writing of the mines, I must needs do so in a general and concise way, as were I to particularize each one that I have seen, it would fill an extremely big book. My object now is to give a general idea of the ores which came under my notice during my survey.

To begin.—In the Red Mountain Park district, on No. 3 Mountain, there are being actively worked a number of mines, varying in depth to 800 feet. In this district in some of the best paying mines, such as the "Yankee Girl," "Silver Bell," and others, the ore is found in what is locally termed "chimnies" or "shutes," but in reality are extinct craters of volcanoes, which prove in working to be very regular and persistent in their character. The walls are composed of porphyry and trachyte, and are from wall to wall about 20 feet in diameter. The ore is a mixture of "tenorite" or black oxide of copper, grey copper and stromeyerite, the latter carrying about \$16,000 to the ton of silver.

The "Yankee Girl" has one main shaft (bratticed) sunk to a depth of 800 feet. Eight levels are driven out 100 feet apart to intersect the "chimnies." The general equipment is very fine indeed, no expense having been spared. This mine has paid \$1,200,000 in the last two years, and its daily output is about 20 tons per day, which is (after the ore has been classified) shipped to the smelters.

The "Silver Bell" is another mine, lying about 1 mile NE of the "Yankee Girl mine." This has a (batticed) shaft sunk to a depth of 600 feet, with 6 levels running to the "chimney" in which the ore is found. The ore is a mixture of grey copper and galena, and runs about 200 ounces to the ton. The walls of the "chimney" are composed of porphyry and trachyte, and are well defined. The size of this "chimney" varies from 12 to 18 feet. The output is about 15 tons per day and is paying very big profits.

This particular district appears to be a volcanic centre, as the whole of the lodes in the outside districts seem to lead or converge towards this point, like the spokes of a wheel to the hub, I beg you will pardon the simile.

Outside mines in the fissure or lode form, are handsomely remunerative. Such mines as the "Virginus," "Ruby Trust," and others too numerous to mention, are being worked extensively, and are all well engineered and equipped.

In conclusion I would say that I regard this field as a most reliable one for investment of capital, and judging from the great influx of money which is pouring in, must, if judiciously

expended, place this district beyond rivalry on this continent.

I am, Sir, yours, etc.,

FRANCIS D. TAYLOR, M.E.



The following shipments of Canadian ore have been made from Montreal from 10th September to 3rd October, 1887:—

Date.	Shippers.	Ship.	Destination.	Tons.
Sept. 9	Lomer, Rohr & Co.	s.s. Earl King.	London	223
12	"	s.s. Khrweider	Hamburg	320
13	Wilson & Green.	s.s. L. Nepigon	Liverpool	246
16	"	s.s. Thorndale	London	318
16	Lomer, Rohr & Co.	do	do	225
17	Wilson & Green.	s.s. Thanemore	Liverpool	256
23	"	s.s. Oce'n King	London	359
24	Lomer, Rohr & Co.	do	do	230
24	Millar & Co.	do	do	535
30	Wilson & Green.	s.s. Canopus	Liverpool	398
Total....				3,110

A well known English authority has estimated the phosphatic manures used during last year as follows:—

England.....	500,000
Germany and Austria.....	800,000
France.....	250,000
United States.....	893,000

Tons of phosphatic manure employed, 2,443,000

The following patents have been issued by the Department of Crown Lands:—To Messrs. Wm. H. Fuller, of Ottawa, and Peter White, of Pembroke, for N^o 1 of lot 12, in 3rd range, Wakefield County, 100 acres as a phosphate mining location. Date of patent, 8th August, 1887. To Archibald Campbell, of Montreal, for lots 8 and 22 in 8th range, Denholm County, 272 acres as a phosphate mining location. Date of patent, 6th October, 1887.

The English market continues strong for 80 per cent. phosphate at a shilling per unit. with one-fifth penny rise, and enquiry is made for 75 per cent. at 10s. On the continent quotations are 13d. to 13½d. for 80 per cent. with one-fifth rise.

Rates from Montreal during the past month have been 7s. 6d. to London, and 4s. to 6s. 6d. for Liverpool. Large quantities could have been shipped at these rates as there was a scarcity of grain, but the low water in the Lièvre river prevented shippers from availing fully of the opportunities offered. Owing to the low freights for grain and deals one large steamer took phosphate for ballast and went to Norfolk, Va., to load cotton for Liverpool.

Kingston District.

A gentleman who has been successful in the iron mines of Lake Superior, has bonded or purchased several phosphate mines in the district north of Kingston, Ontario. He has also secured the refusal of several iron properties in the same region. It is supposed to be his intention to organize companies in the United States to work the properties that may be acquired.

Mr. John Foxton, of Sydenham, Ontario, has worked all the season upon a rich deposit of green phosphate, which, at a depth of seventy

feet from the surface, shows a width of several feet. All the drilling is done by steam and the hoisting by horse power.

The mines of Capt. Boyd Smith in Hinchinbroke and Bedford are producing a large quantity of phosphate, the bulk of which analyses 85 per cent. The deposits on this property are quite unique, being found in association with masses of magnetic iron. Seven distinct veins run for nearly a mile in a south-west and north-east direction, and contain on the surface either iron alone or iron and phosphate side by side. These seams when followed down sometimes turn wholly into phosphate and occasionally widen to a considerable extent. One pile of 300 tons is said to be composed of a larger average size of lumps than has ever been seen in Canada, showing that the deposits have been both extensive and pure.

Mr. James Bell has taken out a considerable amount of phosphate from his property near Lake Opinicon. Mr. Loishley, of Elgin, and Messrs. J. Smith & Co., of Sydenham, have also been producers this season. But with the exception of those mentioned before, no other persons have been shipping from the Kingston district. In past years the production of this region has mainly come from farmers, who were careless of the quality of their ore, and the low analyses obtained discouraged purchasers. By more attention to raising the grade, phosphate could be profitably mined in this section.

Perth District.

The Anglo-Canadian Phosphate Company, at the Otty Lake Mines in North Burgess, Ont., are sinking on a seam of phosphate in order to test the extent of the deposits at a depth. They are now down 100 feet and expect to sink another 100 feet before spring. Nearly three hundred openings have been made on phosphate on these properties and carried to depths of 20 to 30 feet. The seam now being worked has varied in width from one foot to seven feet of pure phosphate, besides several feet more of mixed phosphate and mica. If the seam is found to be large and pure at a greater depth it will support the supposition that many of the numerous openings will result similarly. As no deep mining has ever been done in this district, the experiment will be of great value and it successful will give encouragement for further operations.

Capt. Moore who has had a gang, of about 8 men prospecting on several lots here, has met with encouraging success. Some very large deposits have been uncovered. About 1,000 acres have been purchased, and offers have been made for several other locations.

Templeton District.

Messrs. McLaurin & Blackburn have made a division of the phosphate lands jointly owned by them, and the valuable mines in the 11th range of Templeton are now the property of Mr. Robert Blackburn, of New Edinburgh. The phosphate from these lots has gained the highest analyses ever obtained from Canadian phosphate in England and Germany, cargo lots this season having realized as high as 88 per cent. The mine is being timbered with reference to enlarged and economical methods of production. 1250 tons have been shipped during the present season.

Mr. Jackson Rae proposes to continue work, during the winter, in the deep shaft which has been sunk on a fine body of ore upon his lot in

the 10th range. The inclination of the shaft is so gradual that a skip railway is effectively used for hoisting the ore and rock.

The Canada Industrial Company have been working upon lots in the 10th range and have opened some good shows. They have erected substantial buildings and finished them with more taste than is usually displayed in mining regions. During the month bush fires have been very prevalent in this district, and they approached so close to this property that the buildings were for some time in imminent danger of being destroyed. As it was, several wooden outhouses were burnt to the ground.

Messrs. Gillespie, Paterson & Co., have been doing good work in the same locality, and have found some extensive seams. A small force is at present working in pit 2, from which the management state that about 150 tons have been mined this year. Nearly 250 tons have been mined from pit 1. Some negotiations have been made for the purchase of this property.

The Templeton & Blanche River Company, organized in Montreal during the present year, are making most satisfactory progress on their property. A first class road has been built, some very commodious buildings erected and a large number of pits opened. The surface indications are very rich, and the outlook of the new organization is very promising. Additional capital for enlarged working is being procured and machinery of the most approved pattern will be put in before the snow flies. Mr. Tom Hines, an experienced miner, is in charge of the work.

Messrs. W. A. Allan, Ottawa; E. K. Green and T. Trimble, Montreal; accompanied by a representative of the REVIEW, paid a visit to the mines of this district during the month.

The Lièvre District.

Mr. Jas. White, who was injured in the Little Rapids accident, has been removed to his home in Western Ontario. He expects to be able to resume work in the course of next month.

Messrs. Poupore & Thompson, the contractors, are now making satisfactory progress with the new Lock and Dam at Little Rapids. A frame house for the Lockmaster has been erected, most of the loam has been removed, and the rock-work, it is thought will be begun about the 15th of next month.

Shipments by the Lièvre River have been much retarded by the low water, there having been but two feet depth at the Little Rapids. Barges could carry but one-third of their usual load. About a thousand tons of phosphate have been delayed, and claims by steamers in Montreal for dead freight and demurrage are causing some vexatious disputes. The need for the dam and canal, now being built, after years of needless delay, is made clearly manifest, and it is to be hoped that the work will be hurried forward with all possible speed.

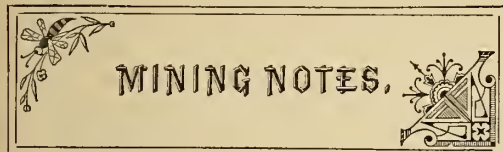
Latest reports state that the water in the Lièvre has risen several inches.

The High Rock and Emerald mines have each been giving large outputs, the quantity being a little restricted by scarcity of labour, as the lumber camps have been securing their hands for the winter.

The North Star mine, under its new manager, Capt. Tom Williams, has been producing a larger output, and its shaft is now down 650 feet. The phosphate seam still continues of large size, and the demonstration of the existence of the mineral at depths is of much value to the district.

The output from the Union Mines will be about 350 tons.

At Little Rapids work is being steadily conducted. A rich show has been opened about 2,000 feet from the main shaft, which is developing nicely. Mr. George Smith, the superintendent, has severed his connection with the mine to take a position with the Ingersoll Rock Drill Company of Montreal.



Nova Scotia.

Since they were opened up the product from the Oxford Gold Mines has been 10,900 ounces of gold, or say some \$20,000. This year 2,440 ounces have been obtained from 650 tons crushed, an average little short of 4 ounces to the ton. Only forty men are at present employed. The company owns 64 mining areas, covering a tract of land 2,100 feet long by 1,500 feet wide; but most of the gold so far obtained has been from a strip 500 feet long by 25 feet wide, and 47 of 64 areas have not been opened. Thirty-five leads have been cut on the property and nearly all have shown gold. The works are in the hands of Mr. J. M. Reid, a thoroughly competent manager.

The last crushing at the Brunswick Mining Company's property gave 26 ounces from 40 tons of quartz taken from the Forrest lead, and 36 ounces from 35 tons of quartz from another lead. The company own a district five areas in width by about $\frac{3}{4}$ mile in length.

The following are the official returns for September so far received at the Mines Office:—

District.	Mill.	Tons Crushed.	Oz. Gold.
Wine Harbour.....	Victoria.....	33	6 $\frac{1}{2}$
East Rawdon.....	Rawdon.....	390	197 $\frac{1}{2}$
Lake Catcha.....	Oxford.....	60 $\frac{1}{2}$	234 $\frac{1}{2}$
Dar's Hill Salmon river.	Dufferin.....	910	319
Whiteburn.....	Cushing G. M. Co.	10	21 $\frac{1}{2}$
Stormont.....	Tributers.....	79 $\frac{1}{2}$	78 $\frac{1}{2}$

It is stated that the ore of the Eastern Development Company, Limited, shows wider streaks of the concentrated chalcopryite as depth is attained. An assay of these streaks or bands of ore just made by the provincial assayer gives 31.71 per cent. of copper. All the concentrated ore streaks of the mine will run 20 per cent. copper and over, but when the entire width of the vein is crushed the intermingled barren rock brings the average down to from 5 per cent. to 10 per cent. The vein at the point the samples referred were taken is 10 feet in width, the depth being 220 feet.

Quebec.

Gold has been discovered on the property of Captain Bothwell, near Buckingham. Specimens sent to and assayed by Dr. J. T. Donald, Montreal, are certificated to have given 42 oz. 11 dwt. 16 grs. to the ton, or a cash value of \$800. The ore sent was not free milling, but

sulphurets. The vein has been traced through other properties, the owners of which are placing absurdly high valuations upon them. Several general specimens have been sent by disinterested parties to Dr. Hoffman, of the Geological Survey, to assay, and until his report has been received it would be unwise to place too much value upon the many reports now in circulation.

Mr. John P. Mullarkey, of Montreal, has secured a mining patent from the Department of Crown Lands for the W $\frac{1}{2}$ of lot 37, in 5th range Bersford, containing 9 $\frac{1}{4}$ acres, as an Inferior Metal Mining Location (Iron).

Ontario.

The siding from the Kingston and Pembroke Railway into No. 1 mine of the Calabogie Iron Company, is nearing completion. The lessees can then ship the accumulated ore, and realize on the product.

Silver has been found on the farm of a Mr. Racicot, near Lake Nosbonsing, in the Township of Ferris.

Messrs. Smith & Lacey are turning out large quantities of bright amber mica at their Ell Lake mines, near Sydenham. In the principal working there is now a vein ten feet in width composed entirely of mica crystals, some of them very large in size. The mica is of a light amber shade.

A very sad accident, whereby one man was killed and several others were seriously injured, occurred at the Calabogie iron mines on Friday, 7th instant. While eight men were working in the pit the roof gave way and ten or twelve tons of rock came down and completely buried them. The whole party had a marvellous escape from instant death.

Port Arthur District.

From the large variation of the needle, amounting to 135° in a number of places, Mr. M. J. Butler, P.L.S., is of the opinion that vast beds of magnetic iron ore will be found in the township of Marks, as it is scarcely probable that such a large variation would be caused by the presence of the small pieces of magnetite usually found associated with trap rock. One peculiarity which he has never seen noted before, was the constant variation; it is quite a common thing, he says, to see the needle 15° off the course for a distance of fifteen or twenty chains before any change in the variation would be noticed, when the needle would veer over suddenly to the opposite side of the pole and record 5° for a distance of ten or fifteen chains.

RABBIT MOUNTAIN MINE.—The management have completed the setting up of the last of the new machinery recently purchased, with a view to deeper and more extensive explorations. This machinery consists of: 1st. A large double drum hoisting apparatus of the most improved construction. These drums are independent, and may be used to work two shafts. With this they sink 1,000 feet at least. 2nd. An Ingersoll 7 drill compressor, with which they run four Ingersoll drills; and 3rd, a new six ton steel boiler, to supply the compressor and hoist. The compressor also works the underground pumps. Sinking with two drills is now being carried on below the 250 foot level. The vein here is very promising, and a rich ore body may be struck at any moment. At present the ore is, however, low grade. The 250 foot drift north is being pushed vigorously ahead through

dead ground, when it is expected that it will strike the continuation of the rich ore chute from the surface. The 200 foot level will now be pushed south with all speed. The vein in this direction looks very well, and it is confidently hoped that this drift will not go far before being in bonanza. The mill is not yet running, as they are awaiting the opening up of more ground.

THE BEAVER MINE.—This mine is still in bonanza. The main or lower adit having been found to be richest of all. The management are shipping a great deal of very high grade ore from above this level, part of which is sent to the smelting works direct as it is too rich to mill—the rest is milled. The ore is first stamped, then concentrated on true vanners, and the tailings are amalgamated. The ten head of stamps have been in continuous operation for some months, and by the look of things they will have soon to be increased. As it is the owners have ten head more on the ground and intend to erect them this fall. Owing to the soft nature of the ore the ten head at present working, stamp nearly 30 tons per day. They are now sinking below the level of the main adit, and the shaft is now some 40 feet down, still continuing in the rich ore body. The owners have decided to organize this mine as a joint-stock company, capital \$5,000,000; so it is stated. Mr. W. H. Furlong, M.E., is leaving at once to make the underground survey necessary for maps and reports. A new vein has recently been found on this property within half a mile of the Beaver vein. About 12 men have been working on this for a month with the most encouraging results. The vein, though small, is exceedingly rich in silver and silver ore, and though, as the workings continue into the hill, the width of the vein steadily increases, there has been so far no diminution in the quantity of silver. This vein runs almost at right angles to the Beaver.

THE PORCUPINE MINE.—This property, it is understood, has just been sold to Detroit people. Two experts have been here in their behalf and have submitted it to a most searching examination, the result of which will not be known for a couple of weeks. It is the intention, if the sale is affected, to at once commence operations on a large scale.

THE SILVER MOUNTAIN MINE is still being operated by a strong force of men, and work almost entirely exploratory in its nature is carried on. A good quantity of stamp rock has been got, both from their shafts and adits, but nothing extraordinarily rich; still, however, the prospects are extremely good, not to say flattering.

THE CROWN POINT MINE is being worked with a small force of men, and in the one adit level being opened they are getting some extraordinarily rich silver ore. It is reported that this mine is under contract for sale. In the event of this going through, we may expect to see a really valuable property worked as it deserves.

There are a number of new discoveries and properties being worked by two or three men that are not at present individually worthy of mention. The latest discoveries have been a short distance north-west of White Fish Lake, and north-east of Arrow Lake. When it is considered that the new railroad, a portion of which is now under contract, will pass through this district, the future is a very promising one.

Still further to the west, and near to the International Boundary, there has lately been found large deposits of hematite iron ore, and Americans, who have traced the belt through from Minnesota, have been taking up some thousands of acres of land there. This very place is located for the Canadian terminus of the new railroad. To the east of Port Arthur some of this iron has lately been found, which, if the deposits are extensive, will rival any iron on the north or south shores of Lake Superior. It will be spring again before the necessary explorations can be carried on.

Rat Portage District.

Though there is at present no gold mining carried on in this most promising district, there is certain to be, at no distant date, a great deal of it. The Gold Hill people did make an arrangement with a large London syndicate about the workings of their property. They were, however, unable to obtain their patents from the Crown Land Office, and it is said the agreement fell through. There are several other properties on the Lake of the Woods besides this, however, which, had they clear titles, could be made handsomely dividend paying mines. It is authoritatively stated that if patents are issued work will yet commence this year on more than one vein in this district.

Manitoba and North-West Territories.

The Medicine Hat Coal Mining Company are advertising for the sinking of a shaft, and will endeavour to have the same completed this fall. The prospects are good for the construction of the Medicine Hat Railway to the mines either this fall or early in the spring.

A correspondent who recently visited the Canadian Anthracite Coal Company's mines at Banff sends the following:—

The place is reached by driving five miles from Banff and then by walking down the railway track for a mile, for Anthracite has no wagon road to it. It is thus a sort of island in the mountains. The little mining village of some 200 or 250 people has grown up very rapidly—in less than a year—and, as every one knows, owes its existence to the discovery of workable beds of coal within a stone's throw of the railway. The obliging superintendent of the mine afforded every facility for visiting it, and the writer penetrated every tunnel to the very end. The work of coal mining is here very easy. The mouth of the pit is about forty feet above the railway track. The approach is nearly horizontal, as the mountain side is entered, and is some twelve feet in diameter. This allows a track to be laid, on which, drawn by horses, are the usual shaped trucks of the coal pit. Carrying lanterns, we penetrated the darkness, and reached the first seam. This is a splendid coal layer seven feet thick, with a dip of perhaps 30°. This had been worked both right and left. Entering the left hand tunnel we followed it to the very end, 520 feet, and secured from the men working at the extreme point a choice specimen of coal. Similar tunnels further in were followed, one where the coal was about three feet thick, and another of nearly five feet. On going into the extreme distances the air became heavy, and we were glad to learn that for the health of the miners ventilating apparatus will soon be introduced. The coal is thus very easily mined. It is brought out by the horse trucks and thrown down an inclined frame of iron bars. This in the meantime serves for sorting, but a rotating sifting apparatus is being prepared, which will be a great improvement. After picking over to remove any shale present, the workmen conducted the coal by spouts to the cars on the railway track. The expense of mining and moving the coal must thus be reduced to a minimum. The great question asked is as to the character of the coal. The government geologists in our North-West have been too timid. They for years decided against our Northwestern coal, but now such splendid deposits as that of the bituminous coal from the Galt mine are pushing their way into recognition. Scientific opinion should encourage, not raise doubts, as to important enterprises. To many it seemed too good to be true that we should find real anthracite on Canadian soil. It was wrongly said there is but one real anthracite deposit in the world and that in Pennsylvania.

Of course there are anthracite beds in South Wales and Peru, and now we know we have this valuable anthracite mine in the Rockies. The London *Times* correspondent calls our deposit semi-anthracite. Anthracite is simply stove coal. The specific gravity, percentage of carbon and hardness of the Rocky Mountain coal rank it with anthracite. The writer has burnt this coal. It has a small amount of flame, has intense local heat and no smoke. Its local conditions are similar to those of the Pennsylvania anthracite, for it is among the dislocated rocks where pressure and possible heat may have been applied, as is the case where the Alleghenies of Pennsylvania have changed the bituminous coal to anthracite. It is not easy to determine, without a full geological investigation, the age of the Rocky Mountain coal. Carboniferous rocks do occur in the Rockies, and at a higher elevation on the brow of Twin Peaks Mountain are Silurian beds, but in the Rockies the carboniferous and cretaceous are very conformable, and it may of the latter. At any rate the practical tests of our black diamonds from the mountains are highly satisfactory, and while we were at the mine an order of 4,000 tons for San Francisco was being filled. It would not be surprising if this anthracite should drive out the poorer varieties of bituminous coal found on the Pacific Coast, for the bituminous coal of Nanaimo is somewhat inferior to our Galt mine coal. Our party returned from Anthracite rather begrimed and blackened by the visit to the coal mine, but filled with deep thoughts as to the possibilities in many ways of our Rocky Mountains.

Dr. Selwyn, Director of the Geological Survey, has just returned to Ottawa from an extended tour through the various mining districts. He is of opinion that the extent of the vein, upon which are the Banff and Lethbridge coal mines, is almost unlimited, and that there is sufficient to supply the entire North-West for many years to come, as well as a healthy export trade.

British Columbia.

Mr. T. H. Collins, F. G. S., the well known Mining Engineer and Metallurgist, of London, England, is now at Yale, British Columbia. His object is to become acquainted with the mining capabilities of the province, with a view to the introduction of British capital, and he will be glad to receive communications from *bona fide* prospectors and discoverers.

The Illecillewaet Silver mines have been closed down. Snow has fallen two feet at the upper mines.

A telegram from Illecillewaet to the Selkirk Mining and Smelting Co., announces that the company will ship to San Francisco their sixth carload of silver ore, weighing twenty tons, and valued by assay at \$1,600. This makes the aggregate of the shipments to date nearly \$8,000. The mines look better than they have ever done, and regular shipments will continue.

The total amount of coal shipped from Nanaimo for the month of September was 27,730 tons. Of this Dunsmuir & Sons shipped 17,700; the East Wellington Co., 2,340, and the Vancouver Coal Co., 7,550 tons.

From a letter dated Camp McKinney, Sept. 16th, written by Mr. J. W. Reade, a practical miner and assayer, we extract the following, re the Rock Creek Mines:—

"The 'Amelia' shaft is down 50 feet; the company will commence to cross-cut the vein on the 20th. The 'Cariboo' shaft is down 42 feet, with a vein at that depth seven feet wide; the ore will concentrate 25 per cent. of sulphurets that will assay from \$500 to \$300 to the ton. They have quit sinking on the main shaft, and are at present getting out free milling ore to run the little mill which will be in operation soon. I think, however, that the 'Cariboo' will change hands before the snow flies, as a mining expert from Montana, who has been here for two weeks sampling the ore, told me just before he left for Butte City, that he was well satisfied with the property, and Mr. Rice—one of the owners

—has gone to Spokane Falls in company with him. I expect to hear any day that the property has changed hands. I sampled some ore from the 'Alice and Emma Consolidated' mine, and made two assays obtaining splendid results. The district is looking better every day, and I am now fully satisfied that in the near future we will have one of the richest mining districts in British Columbia."

The latest news received from Island Mountain mine is of an encouraging character. The vein was tapped 300 feet below the first tunnel and run in on a fine ore of considerable width. Work on the mill buildings is getting along well. The mill is about closed in and a portion of the machinery is in position. The boiler house is up and the boilers bricked in. The brick for furnaces did not turn out as well as expected, being too soft. The development of the mine is proceeding, and it is expected that crushing will soon commence.

The Hon. Secretary of the Nanaimo Relief Fund has received a letter from the Hon. Jno. Robson, Provincial Secretary, stating that the plan of distribution and the mode of management of the Relief Fund, has been entirely satisfactory to the Provincial Government, and that \$5,000 would be donated by the Government towards the Nanaimo Relief Fund.

A large number of miners came down from Alaska on the Idaho, with sums varying from \$600 to \$2,000 as the result of their season's work. The general opinion of the miners is that the diggings are very productive, but the weather is frightfully severe, rendering it almost impossible to work but for a short time in mid-summer.

United States.

The quarterly report of the Plymouth Consolidated Gold Mining Company dated 1st October gives the following:—

Gold	
Bullion Produced.	
January, 1887.....	\$62,350.49
February.....	60,683.76
March.....	59,296.45
April.....	60,893.03
May.....	78,822.34
June.....	65,029.14
July.....	64,732.17
August.....	59,696.14
September.....	59,025.58
Total product for nine months, '87	\$570,529.10
Operating expenses for same period	221,950.00
Profit.....	\$348,579.10
Addition to Pacific Mill—40 Stamps.	44,324.20
	\$304,254.90
Cash on hand, Jan. 1st, 1887.....	81,079.89
Amount applicable to Dividends..	\$385,334.79
Paid dividends for nine months	
Nos. 44 to 52.....	255,000.00
Surplus, Oct. 1st, 1887.....	\$130,334.79

Having been short of water (on which the company depend for power) for two months past the Empire Mill has been compelled to run on short time, thus reducing the output for August and September below the average. The fall rains are now due, and will soon furnish a full supply. The dividend payable 5th of October will be the fifty-third consecutive monthly dividend, making a total of two millions one hundred and twenty thousand dollars paid to the shareholders since the consolidation, June 1st, 1883, being twenty-one dollars and twenty cents per share.

MISCELLANEOUS PARAGRAPHS.

The Horrors of Fire-Damp.—No meteor, however terrible it may be supposed to be, can be compared to an explosion of fire-damp. Let one of those scourges of heaven be imagined (which appear sometimes as if designed for the punishment of human beings) a thunderbolt, a hurricane, a cyclone, or a whirlwind—burning, overthrowing, destroying everything in their course, and the effects produced by them will still be inferior to those caused by an explosion of mine gas. A discharge of a cannon loaded with canister shot, and fired point blank into a crowd; a powder magazine taking fire in the midst of a body of workmen; a gasometer exploding in a factory—can scarcely give an idea of an explosion of fire-damp suddenly overtaking the miner. The moment the mixed gas comes in contact with the flame of a lamp a tremendous explosion takes place, resulting from the combination of the components of the fire-damp, hydrogen and carbon, with the oxygen of the air. The two former separate to combine with the oxygen, with which they have the greatest affinity. The double phenomenon only takes place at a high temperature; without flame it would not arise. The reaction produces an effect like the most brilliant lightning, and makes itself heard by a clap of thunder. The explosion spreads instantly into all the galleries of the mine; a roaring whirlwind of flaming air destroys everything it encounters, overthrowing trams, and bratticing, and trap-doors, mounts into the shaft, and lifts from their foundations the staging which covers its mouth, through which it discharges thick clouds of coal, stone, and timber. The men are blinded, thrown down, scorched and sometimes burnt to a cinder; often their clothes take fire, and not unfrequently they are buried beneath the ruins of the fallen roofs. When an attempt is made to fly to their assistance, there is not time to rescue them; there are only corpses left which are scarcely recognizable. The calamity spares nobody, even though as many as one or two hundred miners may be at work; death extends over the whole of the mine where the explosive gas was present. The air-doors are thrown down, the ventilation of the mine is reversed, the underground atmosphere is vitiated by the combination of the fire-damp, and the stalls are filled with steam and carbonic acid. Sometimes the temperature rises so much that the coal is converted into coke at the sides of the galleries, and the commotion is so great that the dams have to withstand both fire and water, and the wallings, raised for the purpose of resisting the thrust of the measures, are themselves overthrown. Then to a scene of already indescribable desolation are added the horrors of inundation, falls of the ground, and fire, when the explosion has already made only too many victims. To add to so many horrors the foul air, carbonic acid, the after-damp or choke-damp, spreads throughout the mine, and suffocation terminates the existence of those in whom the explosion had left a spark of life.

A Just Estimate.—Perhaps no other industry has been so misunderstood as mining, and has been compelled to bear the burden of unjust condemnation which belongs to other, altogether foreign excrescences, which like parasites have fastened themselves upon it. If a poor farmer

attempts to conduct business on a farm by methods altogether impracticable and contrary to the best experience of years, the failure, when it comes, falls upon the man and his lack of wisdom, instead of being made an argument against farming and the farm, but let a mine be ever so extravagantly mismanaged by the most inexperienced and dishonest superintendent, the loss of money and all the long train of disasters is charged at once, to the uncertainty of mining and the worthlessness of mines. Simple justice demands more discrimination, and we may say that, with the more general information prevalent, it will be more difficult hereafter for the mistakes, fraud and inefficiency of incompetent management to place the responsibility to the account of the mine or of mining. Coal, iron, zinc and lead mining have passed through this phase in the history of their development, and it is time that silver and gold mining were divorced from speculative excitement, stock fluctuations and everything outside of the line of steady production. All must come to this point before the best results can be achieved, and before mining can be justly estimated at its true value in its influence upon the steady improvement of national prosperity and substantial advancement.‡

A Simple Process for Measuring Water.—To measure water roughly in an open stream, take from four to twelve different points in a straight line across the stream, and measure the depth at each of these points, and adding these together, divide by the number of measurements taken. This quotient will give you the average depth, which should be measured in feet. Multiply this average depth in feet by the width in feet, and this will give you the square feet of cross section of the stream. Multiply this by the velocity of the stream in feet per minute, and you will have the cubic feet per minute of the stream. The velocity of the stream can be found by laying off 100 feet on the bank, and then throwing a board into the stream at the middle, note the time passing over the 100 feet, and dividing the 100 feet by the time, and multiplying by sixty, gives the velocity in feet per minute at the surface. The velocity at the centre is only eighty-three per cent. of that at the surface, and so only eighty-three per cent. should be calculated. For example, suppose the float passes 100 feet in 10 seconds, that divided by ten and multiplied by sixty (seconds in the minute) gives 600 feet per minute as the velocity, and eighty-three per cent. of this gives 498 feet per minute as the velocity of the stream at the centre, and the area of the cross section multiplied by this will give you the number of cubic feet per minute in the stream. This, of course, is only a rough way of calculating, but it is often used, and is a good and simple way to obtain data to select a wheel by.

Ontario Gypsum Beds.—The gypsum beds of Paris on the Grand river have been worked for nearly half a century. South of the town they are found on the west side of the river, and on the north of it on the east side, extending a distance of about four miles along the river. There are two beds of three or four feet in thickness, interstratified with 16 or 18 inches of shale. They lie about ten feet above the level of the river and sixty or seventy feet below the table land. The quarries on the south side of the town have been worked during the past four years by Messrs. A. S. Gill & Co., who also have a mill in the town for grinding rock into the plaster of commerce. This quarry

has been worked for more than forty years and the tunnels have penetrated a distance of nearly 600 yards. Ten hands are employed on the works from October to May of each year—five miners, three mill hands and two teamsters. The average yearly product for the past four years has been 1,500 tons, which readily sells at \$1 to \$1.50 per ton at the mill. Owing, however, to its great weight and cheapness it will not stand the expense of shipment to any great distance for agricultural purposes, and the production is largely limited to the demands of the locality. The same company operate a quarry on the Jones tract, on the east side of the Grand river, in North Cayuga, their average annual output being about 650 tons. The cost of quarrying at Paris is ninety cents per ton and in Cayuga ninety-five cents, the average wages of workmen being \$1.25 per day. A new industry has been established in connection with the gypsum works of this town—the manufacture of alabastine. This article is produced from rock gypsum found in the mine near Cayuga, on the Grand River. It is used for painting purposes and takes the place of kalsomine. It is claimed by the manufacturers that as a first coating under oil paint on wood, brick or any other outside surface where paint is used, the saving in expense will be fully one-half. The deposits on the Grand river, below Caledonia, occur above Cayuga on the west bank of the river, while below the town, where the river turns and flows south-east, the beds occur on the north side. The deposits in workable thickness are confined to certain areas, having been formed, it is supposed, in ancient lake bottoms. The first bed, opened some forty years ago, was below Cayuga, and operated by Messrs. John Brown, of Thorold, and Wm. H. Merritt, jr., of St. Catharines. Large shipments were made to the United States—to Cleveland, Detroit, and other places; but on the discovery of the Michigan beds this trade was greatly reduced, although the Michigan gypsum is of inferior quality. This mine was worked in a small way on and off until it was reopened in 1879 by Wm. H. Merritt, who built a mill for grinding the rock. With much encouragement from the late Hon. George Brown the consumption of Canadian white land plaster in Ontario has been considerably increased in competition with the American gray, which comes over from Oswego, and which is very impure gypsum. There is a mill on Gill & Company's property, nearer Cayuga, which was built by the late A. W. Thompson and there are two above Cayuga, at Mount Healey and York, run by Donaldson & Bros., and Thomas Martindale, respectively. At Caledonia Mr. Johnson (late N. Garland & Co.) grinds some land plaster. The whole output along this lower part of the Grand river in land plaster and rock varies from about 4,000 to 5,000 tons per annum. The plaster is sold in Ontario for the most part, the duty preventing much from being shipped to the United States, while the rock, which is duty free, is chiefly shipped to that country.

A Miner's Heroism.—In a certain Cornish mine (South Caradon) two miners deep down in the shaft were engaged putting in a shot for blasting: they had completed the work, and were about to give the signal for being hoisted up; one at a time was all their coadjutor at the top could manage, and the second was to kindle the match and then mount with all speed. Now it chanced while they were both still below, one of them thought the match too long; tried to break it shorter; took a couple of stones, a flat and a sharp, to cut it shorter; did cut it

of the due length, but, horrible to relate, kindled it at the same time, and both were still below! Both shouted vehemently to the coadjutor at the windlass, both sprang at the basket; the windlass man could not move it with them both. Here was a moment for poor miner Verran and miner Roberts! Instant horrible death hangs over both, when Verran generously resigns himself: "Go aloft, Roberts," and sits down; "away, in one minute I shall be in Heaven!" Roberts bounds aloft, the explosion instantly follows, bruises his face as he looks over; he is safe above ground: and poor Verran? Descending eagerly they find Michel Verran too, as if by miracle, buried under rocks which had arched themselves over him, and little injured; he too is brought up safe, and all ends joyfully, say the newspapers. As Verran was anxious after this to work above ground, and also to gain a little schooling, a few hearty admirers of his heroic act were glad to subscribe a little sum to enable him to spend some months at school. Here he acquired the great arts of reading and writing, then established himself in a farm and married a schoolmistress, with whom he and his affairs have prospered as they deserved.

Experience, Essentially Requisite.—

Perhaps no other line of enterprise has suffered so much from inexperience and a total disregard of the fundamental principles of business, as the mining industry in this country. Methods have almost universally prevailed at times which now careful observation shows to have been most reckless and uncertain, having in them no evidence of reliability which would recommend them to the careful consideration of the intelligent and conservative business man as investment. It is now apparent that the almost general unfavourable results might have been safely predicted by any one of ordinary capacity, and it is also certain that at the present time it would be almost impossible to secure the investment of a dollar in any such proposition. This fact shows a marked improvement at the present time over the methods which have previously prevailed to such an extent and with such influence that its effects have as yet been by no means entirely removed. It may not be necessary to repeat that production is the chief object to be attained, and the security assured in this direction must be considered the only real basis of value in investigating the merits of any proposition in this great field, which promises such great results under proper management.

The Influence of the Mining Press.—

The history of the struggling existence and final starvation of hundreds of local papers, in prosperous mining localities, is not a creditable record for an industry so broad and liberal in many other respects, especially is this true in view of the fact that the mines have been most faithfully upheld, and owe the larger proportion of their value and success to the very means which has been neglected and unrewarded. The report of mining properties, strikes of ore bodies in mines, shipment from smelters, value of ore and mill runs, has been most faithfully made by the local paper, to be copied by the metropolitan reviews in the capital centers, until a tide of inquiry and investment has been attracted to the locality, and a general condition of prosperous activity established by which hundreds have been benefitted. In many cases this gratuitous work, which has cost time and money, has been done faithfully and impartially for those who have never contributed the amount of an annual subscription to the paper

which has been the chief cause of their prosperity. The mining industry of the United States today owes its present promising condition, its general activity, the favourable state of public opinion, the investment of capital and the wonderful development everywhere witnessed, more to the influence of the press than to any one or all other influences combined, but its return for all this benefit has, as a rule, been most niggardly and certainly unjust.

The Pierce Method of Charcoal Manufacture.—In the ordinary kilns one cord of wood has yielded from 30 to 35 bushels, of about 20 pounds to the bushel, while in the Pierce process of distillation in retorts the average yield of charcoal is claimed to be 50 bushels to the cord, which is worth, at 60 cents per bushel, three dollars. There are also obtained three gallons of crude wood alcohol per cord, valued at 95 cents per gallon at the works, \$2.85; 150 pounds of acetate of lime per cord, 1 cent per pound at the works, \$1.50; and 1,000 pounds of combustible hydrocarbons, equal in value for heating purposes to the amount of three dollars of other fuel; a total of \$10.35, against about \$2.25 worth of charcoal under the old process. The first works in the southern United States were built at Gooderill, Tennessee. This plant consists of 20 charcoal kilns and a 25 ton furnace. The second works to use this process were erected in 1886 at Calera, Shelby County, Alabama. This plant consists of 38 charcoal kilns, now in operation, with a capacity of 40,000 cords of wood per annum. The charcoal produced by this process has also been used at the Warner Furnace, West Tennessee, and at the Etna Furnace in the same district. The Decatur Works, Alabama, with 48 charcoal kilns, having an average capacity of 56 cords per kiln, or a total annual capacity of 40,000 cords, are now nearing completion. Alcohol and acetate of lime departments are connected with the plant. A 50 ton furnace is to be built during the present year, the size of the furnace, 12 feet bosh, 60 feet high, with a blowing engine having a steam cylinder 36x48, and a blowing cylinder 48x84 inches. The works in course of erection by the Nashville Iron, Steel and Charcoal Company, are constructed to use this process, and will consist of two 60 ton furnaces, with two blowing engines to work in combination, of which the steam cylinder will be 36x48 inches, and the air cylinder 48x84 inches. For the manufacture of charcoal there will be 80 kilns, with an annual capacity of 80,000 cords of wood. The process will also be adopted at several other works.

Quicksilver Ores.—Speaking on the character of quicksilver deposits, Prof. S. B. Christie, of the University of California, in his testimony in a recent case in San Francisco said:—Quicksilver deposits, as a general rule, are very different from those of the ores of other metals. Many other metals occur in well defined fissure veins, so that there is no difficulty in following the ore, and in many cases of calculating before hand the amount of ore in sight; but with the exception of the deposit at the old Almaden in Spain, and to some extent the deposit at the Idria in Austria, the quicksilver deposits, particularly those of California, are characterized by a great and persistent irregularity, so that it makes the mining of those ores much more difficult than that of other metals. New Almaden is a striking example of this irregularity. It has often occurred in the history of the mine that there was none or scarcely any

ore in sight, and it has often looked as though the mines must of necessity be shut down, and it has only been by the most careful and painstaking prospecting or dead work that it has been possible to keep up the production of the mine. Very frequently large bodies of ore will almost completely run out, and there will be visible in the fall of the works only a slight colouration in the vein matter, which indicates that there is ore left in that particular place, and by following out this little spring of ore carefully it may lead into a large deposit. As a result of this the workings of the mine are necessarily very irregular, and it requires the greatest skill on the part of the engineer in charge of the works to keep up a regular and steady output of ore.

Mining in Alaska.—The general formation of the upper Yukon is slate, lime and porphyry. In this formation many veins of gold and silver-bearing quartz have been found, but as yet they remain unnoticed by the miner, and he has rarely taken the trouble to break open a piece of quartz to examine it. Quartz carrying an abundance of free gold was picked up this summer on Forty-Mile creek, but its course is as yet not discovered, and, in fact, unprospected for, the rich gravel bars alone being the attraction. In some places these latter are indeed rich, some miners during this summer having rocked out as high as thirteen ounces in a day at the new diggings on Forty-Mile creek. This place was first discovered late last fall by a man named Franklin, and upon his report of the discovery of coarse gold there, the miners on Stewart and Salmon rivers pulled out for that section, and soon nearly 300 men were on the ground. In fact Forty-Mile creek was the objective point of all who have gone to the Yukon this season. This stream empties into the Yukon river about 100 miles below Fort Reliance, having its source in the Alaskan range of mountains on the east divide and to east of Mount St. Elias and the headwaters of Copper river. Running from Copper river to the east is an immense copper belt sixty miles wide, and it has been traced over the divide 100 miles. The diggings on Forty-Mile commence about three miles up from the mouth, and are continuous ninety miles up, as far as this summer's explorations extended. Several of the small tributaries putting into the main stream were somewhat explored and found to be rich, but scarcity of water in them for washing is a prevailing drawback. The bars worked along the main stream yielded all the way from \$10 to thirteen ounces per day per man, all very coarse gold, the market price in Juneau of which is about \$17 per ounce. Two nuggets were washed out of \$15 and \$32 value. It is estimated that in the neighbourhood of \$100,000 were washed out of these diggings this summer. All the miners, with the exception of those who did no washing to speak of, but spent their time prospecting, rocked out from \$400 to \$2,000 in dust. This gold was mainly taken out of the creek beds and very near to running water, for in no case could the miner wash farther back than four feet into the gravel banks on account of encountering hard frozen ground. The gold rather lies in bunches than otherwise. As one miner has said, several shovels of dirt could be taken up which would contain nothing but a few colours, while another would yield perhaps an ounce. The richest deposits lay behind the boulders and drifts. On one bar three men rocked out on the 25th day of July twenty-six ounces, which is equal to \$442, at the market price. About ninety days

can be considered as the extent of the washing season. High waters are a drawback in the early spring, and the streams commence to freeze up about the first of October. The ground there is covered to some depth with a thick matting of moss, which is impervious to the sun's rays, and in consequence when the ground underneath once becomes frozen it remains so. To obviate this very serious drawback, the miners have set fire to the moss, which in summer becomes as dry as tinder to the depth of several inches, and thus from the heat of the fire, and being uncovered and exposed to the sun, and atmosphere, it is thought that in a short time a vast amount of now frozen gravel will be thawed out sufficient to wash. Should this be the case, there is room enough on Forty-Mile creek and its tributaries for a thousand miners. There is no reason to doubt, and the boys from the Yukon believe, that other creeks that put down from the Alaskan range in that neighbourhood are equally as rich as Forty-Mile creek, but of course nothing whatever is known of them and will not be until explored. Alaska is a great country, and years will come and go before its resources are shown up.

Occurrence of Apatite in Slag.—Mr. W. M. Hutchings writes to *Nature* asking whether any of its mineralogical readers have come across, or have anywhere seen mentioned, the occurrence of crystallized apatite in a metallurgical slag or other artificially formed silicate. Having recently observed such an occurrence, and failing to find any record of such a formation, he says:—"The slag in which I have observed the formation of apatite is produced during the smelting of slag ores into in a blast furnace. It is a basic silicate of lime and ferrous oxide, containing about 30 per cent. of silica. The principal "flux" used in the reduction of the ore is tap cinder from the puddling furnaces, and it is mainly from this source that phosphoric acid is introduced into the slag. The slag itself, in bulk, is dark brown to nearly black in colour. It flows into slag pots of about three hundred weight capacity and cools slowly. I recently prepared some thin sections of this slag for microscopic examination. The greater portion consists of a mass of crystals of olivine, surprisingly colourless and transparent considering how much iron is present. The spaces between the crystals are occupied by deep-brown and yellow amorphous slag, and black sulphides of iron, etc. Both olivine crystals and dark amorphous matter are penetrated through and through by great numbers of apatite crystals in long needles. It is a most beautiful occurrence, analogous in every way to what one sees in rocks. Nearly all the apatite crystals have taken up and enclosed more or less of the amorphous dark material, which forms in the majority of cases a rod running down the centre, but there are also many cases of symmetrical arrangement of dark matter parallel to the sides of the hexagon. The apatite does not only occur in the mass of the slag as above described; it is formed also in free crystals, lining cavities which are formed in the centre of the lumps of the slag, owing to gases carried over from the furnace and liberated during cooling. Some of these cavities are of considerable size, and are often lined entirely with a thick growth of apatite needles, some as thin as the finest hair, others of much larger dimensions. I have taken out crystals over a quarter of an inch long for microscopic and chemical examination. Most of them contain a good deal of the amorphous slag, etc., enclosed,

as in the case of those in the mass of the slag. Sometimes in such cavities very beautiful little crystals of volatilized sulphides are seen among and on the apatites. I have seen galena crystals in this manner, but it is very difficult to remove them from the cavities without damage or loss.

The Oldest Iron Mine in the United States.—The oldest iron mine in the United States that is now in operation is stated to be the Iron Hill Mine in Delaware. It was discovered in 1684. The ore obtained from the mine is now treated at the Principio Iron Works, Maryland, at which works a blast-furnace was first erected in 1720. There has been no blast-furnace work at Delaware for some years past.

Explosives for Fiery Mines.—Some important information relating to explosives suitable for blasting fiery mines is given by Hilt.** Experiments with the high explosives show that dynamite will ignite a gaseous mixture containing more than 5 per cent. of fire damp. Nitro-dynamite and gelatine dynamite give more favourable results, even allowing 7 per cent. of gas to be present, without firing the coal-dust. The action of the water-cartridge is insufficient with blasting powder, but with dynamite it is safer, since the dust is not fired even with a 6 per cent. of gas. Nitro-glycerine and gun cotton have never caused an explosion even with 10 per cent. of gas. The same results are obtained with the new explosives, romite, carbonite and blasting gelatine. The Prussian Fire-Damp Commission consequently recommends the employment of dynamite with the water cartridge, and permits the use of other high explosives without the water cartridge. The latter, however, can scarcely be used in collieries, as they are too expensive and cause too much dust. Of the new explosives, *anigone* has been found thoroughly unsatisfactory. *Securite* proves to be a safe explosive, resembling dynamite in its action. The products of its combustion are not objectionable. The *Schulze-powder* offers no absolute security in

gaseous mixtures. *Carbonite*, while giving greater security than dynamite, has the same blasting action, and acts on the coal like the best blasting powder. If carbonite could be sold at a lower price, it would be the best explosive for use in the coal mine.

A New Process for the Manufacture of Aluminium has, it is stated, been recently patented in France. The operation is divided into two parts, in the first of which ten parts by weight of powdered alumina are mixed with four of lamp-black, a sufficient quantity of tar being added to form a thick paste. This is then placed in a suitable receptacle and calcined at a red heat till the oil or tar is completely decomposed, leaving a brittle solid, which is then broken into small lumps, and subjected in a closed vessel to the action of an atmosphere of carbon bisulphide, a current of which is kept constantly flowing through the vessel. On raising the temperature, it is said that this agent decomposes the carboniferous mixture with the production of carbonic acid gas and a sulphide of aluminium, from which the pure metal is afterwards obtained with the aid of hydrogen.

The Kimberly Diamond Mines.—The yield of diamonds from the Kimberly Mine alone, from the opening in 1871 to the end of 1885, is stated to have exceeded 17,500,000 carats, equal to 3½ tons weight of precious stones, in value about £20,000,000. To obtain this, as many thousand tons of reef and rock has to be excavated. The mine is 450 feet deep, and the cubical contents of this huge cavity measures about 9,000,000 cubic yards. Four thousand Kafirs are employed at this mine, and more than 20,000 natives of Africa arrive yearly at the mines in search of work; so that the employment of native labour and the development of native trade are incidental benefits conferred on South Africa by the discovery of the diamond fields.

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*Reproduced by permission of the author from the Transactions of the Royal Society of Canada, Vol. IV.

†Crystals from Bob's Lake, Bedford, Ontario, also show this form.

‡*Chicago Mining Review*.

§*Carlyle*.

||*Chicago Mining Review*.

¶*Journal of the United States Association of Charcoal Workers*, Vol. VII, pp 169-170.

***Berg-und Huttenmannische Zeitung* Vol. XIV, pp. 456-7

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2nd.—North half of lot 23, in the 5th range, containing 100 acres.

3rd.—Nine acres of lot No. 28, in the 5th range, with water privileges thereto appertaining, being site of mill dam, etc., etc.

The property formerly belonged to the Montreal Plumbago Mining Company, and was worked successfully for several years, until the company's mill was destroyed by fire, but the mill dam remains almost uninjured, and there are on the property several houses, sheds, etc., built for various purposes when mining operations were carried out.

The Plumbago Deposits

upon the property are regarded as amongst the richest and most extensive in the Dominion. As to the quality of the Plumbago, it has been extensively used in the manufacture of crucibles, lubricating leads, stove polish, etc., etc., and given unbounded satisfaction. This is established by the experience of consumers, and by a certificate from the celebrated Battersea Crucible Works, London, England, a copy of which is open for inspection.

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has also been discovered in quantities.

The lands are in the Phosphate region, and recent prospecting has disclosed a rich and extensive deposit of this mineral. There are unrivalled facilities for transporting the ore to and from the mines by the Ottawa River and C. P. Railway. Distance from mines to Railway Station 6 miles. Good road.

All that is required to make these valuable mines handsomely remunerative is a little capital and enterprise.

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TOWNSHIP OF ASCOT.

- 1st. Clark Mine, Lot 11, R. 7 Ascot 187 acres
2nd. Sherbrooke Mine, part Lots 12 and 13,
R. 7 Township of Ascot..... 329 "
3rd. Belvidere Mine, part Lots 9 and 10, R.
9 and 10, R. 8 Ascot 292 "
4th. Mining Rights in same vicinity on..... 250 "

All of the above properties lie within 1½ miles of the Village of Lennoxville, at the junction of the Grand Trunk, Canadian Pacific and Passumpsic Railways, and have been developed to a considerable extent, and veins opened 6 to 20 feet in width, yielding 3 to 5 per cent. of copper, also silver, and 35 to 40 per cent. of sulphur. These mines are only 2½ to 3 miles distant from the City of Sherbrooke, and evidently are of the same class of ores found at Copelton, only four miles distant, owned and worked by the Orford Copper and Sulphur Company, and by Messrs. G. H. Nichols & Co., of New York, which have proved so remunerative.

TOWNSHIP OF ORFORD.

- 5th. Caruncle Hill Mine, Lots 2 and 3 R. 14, and 2, 3, 4 R. 15, 718 acres. Same class of ore as is found in the Ascot properties above described, but yielding a higher percentage of copper.

TOWNSHIP OF CLEVELAND.

- 6th. St. Francis Mine, ¼ Lot 25 R. 12, 50 acres, with dwelling houses, smith's shop, ore sheds and office, large winding and pumping steam engine, with boiler, winding and pumping gear, and about forty fathoms Cornish lifting pumps complete, railway tracks, ladders, etc., situated three miles from Grand Trunk Railway. A considerable amount of mining work has been done at this mine. A well defined vein richly charged with vitreous purple and yellow sulphurets of copper traverse the entire length of the property, five feet in thickness, yielding 8 to 40 per cent. metallic copper.

TOWNSHIP OF GARTHEY.

- 7th. Fifty-six lots of land, 2,938 acres. This property for the most part is unexplored, but copper is found on the greater part of the property. On one of the lots a vein about twenty feet in width has been found. Samples of the ore have yielded as much as 22 per cent. of copper, being also rich in sulphur. Other samples of pyrites from the same property, free from copper, have yielded as high as 48 per cent. of sulphur. The only drawback to this property is in its distance from the railway, it being about four miles from Garthby Station, Quebec Central Railway. A new line is chartered, however, which, when built, will run directly through the property.

TOWNSHIP OF ACTON.

- 8th. The Acton Mine, 100 acres, with engine, boiler, pumps and appliances. Within three years after this mine was first opened it produced nearly \$500,000 worth of copper. It is situated about half a mile distant from the stations of the Grand Trunk and South Eastern Railways.

- 9th. Brome Mine, part Lots 2 and 3 R. 4, 50 acres.
10th. Bolton Mine, two miles from Eastman Station, Waterloo & Magog Railway, 400 acres.

The above properties formerly belonged to the Canadian Copper and Sulphur Company, and were acquired by the present owner at sheriff's sale, giving an indisputable title thereto.

The whole or any portion of the property will be sold at reasonable prices.

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Mining Regulations

TO GOVERN THE DISPOSAL OF

Mineral Lands other than Coal Lands, 1886.

THESE REGULATIONS shall be applicable to all Dominion Lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, iron or other mineral deposits of economic value, with the exception of coal.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein, either by surface or subterranean prospecting for mineral deposits, with a view to obtaining under the Regulations a mining location for the same, but no mining location or mining claim shall be granted until the discovery of the vein, lode or deposit of mineral or metal within the limits of the location or claim.

QUARTZ MINING.

A location for mining, except for iron on veins, lodes or ledges of quartz or other rock in place, shall not exceed forty acres in area. Its length shall not be more than three times its breadth, and its surface boundary shall be four straight lines, the opposite sides of which shall be parallel, except where prior locations would prevent, in which case it may be of such a shape as may be approved of by the Superintendent of Mining.

Any person having discovered a mineral deposit may obtain a mining location therefor, in the manner set forth in the Regulations which provides for the character of the survey and the marks necessary to designate the location on the ground.

When the location has been marked conformably to the requirements of the Regulations, the claimant shall within sixty days thereafter, file with the local agent in the Dominion Land Office for the district in which the location is situated, a declaration or oath setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as aforesaid; and shall, along with such declaration, pay to the said agent an entry fee of FIVE DOLLARS. The agent's receipt for such fee will be the claimant's authority to enter into possession of the location applied for.

At any time before the expiration of FIVE years from the date of his obtaining the agent's receipt it shall be open to the claimant to purchase the location on filing with the local agent proof that he has expended not less than FIVE HUNDRED DOLLARS in actual mining operations on the same; but the claimant is required, before the expiration of each of the five years, to prove that he has performed not less than ONE HUNDRED DOLLARS' worth of labor during the year in the actual development of his claim, and at the same time obtain a renewal of his location receipt, for which he is required to pay a fee of FIVE DOLLARS.

The price to be paid for a mining location shall be at the rate of FIVE DOLLARS PER ACRE, cash, and the sum of FIFTY DOLLARS extra for the survey of the same.

No more than one mining location shall be granted to any individual claimant upon the same lode or vein.

IRON.

The Minister of the Interior may grant a location for the mining of iron, not exceeding 160 acres in area which shall be bounded by north and south and east and west lines astronomically, and its breadth shall equal its length. Provided that should any person making an application purporting to be for the purpose of

mining iron thus obtain, whether in good faith or fraudulently, possession of a valuable mineral deposit other than iron, his right in such deposit shall be restricted to the area prescribed by the Regulations for other minerals, and the rest of the location shall revert to the Crown for such disposition as the Minister may direct.

The regulations also provide for the manner in which land may be acquired for milling purposes, reduction works or other works incidental to mining operations.

Locations taken up prior to this date may, until the 1st of August, 1886, be re-marked and re-entered in conformity with the Regulations without payment of new fees in cases where no existing interests would thereby be prejudicially affected.

PLACER MINING.

The Regulations laid down in respect to quartz mining shall be applicable to placer mining as far as they relate to entries, entry fees, assignments, marking of localities, agents' receipts, and generally where they can be applied.

The nature and size of placer mining claims are provided for in the Regulations, including bar, dry, bench, creek or hill diggings, and the RIGHTS AND DUTIES OF MINERS are fully set forth.

The Regulations apply also to

BED-ROCK FLUMES, DRAINAGE OF MINES AND DITCHES.

The GENERAL PROVISIONS of the Regulations include the interpretation of expressions used therein; how disputes shall be heard and adjudicated upon; under what circumstances miners shall be entitled to absent themselves from their locations or diggings, etc., etc.

THE SCHEDULE OF MINING REGULATIONS

Contains the forms to be observed in the drawing up of all documents such as:— "Application and affidavit of discoverer of quartz mine." "Receipt for fee paid by applicant for mining location." "Receipt for fee on extension of time for purchase of a mining location." "Patent of a mining location." "Certificate of the assignment of a mining location." "Application for grant for placer mining and affidavit of applicant." "Grant for placer mining." "Certificate of the assignment of a placer mining claim." "Grant to a bed rock flume company." "Grant for drainage." "Grant of right to divert water and construct ditches."

Since the publication, in 1884, of the Mining Regulations to govern the disposal of Dominion Mineral Lands the same have been carefully and thoroughly revised with a view to ensure ample protection to the public interests, and at the same time to encourage the prospector and miner in order that the mineral resources may be made valuable by development.

COPIES OF THE REGULATIONS MAY BE OBTAINED UPON APPLICATION TO THE DEPARTMENT OF THE INTERIOR.

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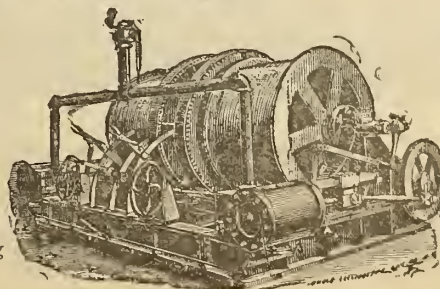
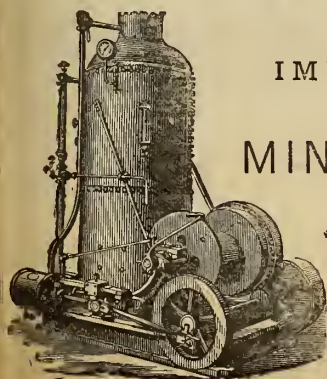
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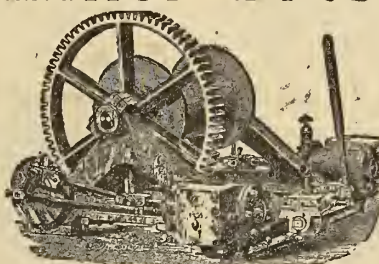
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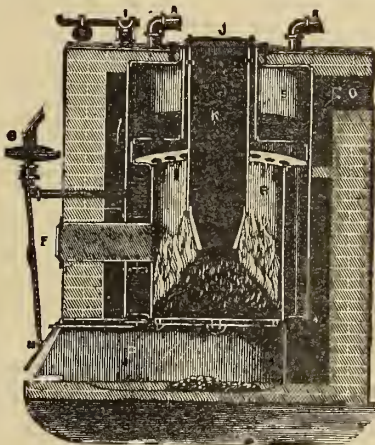
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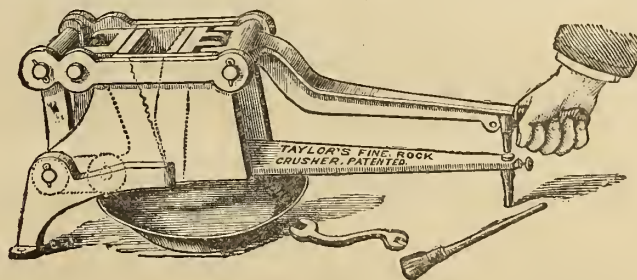
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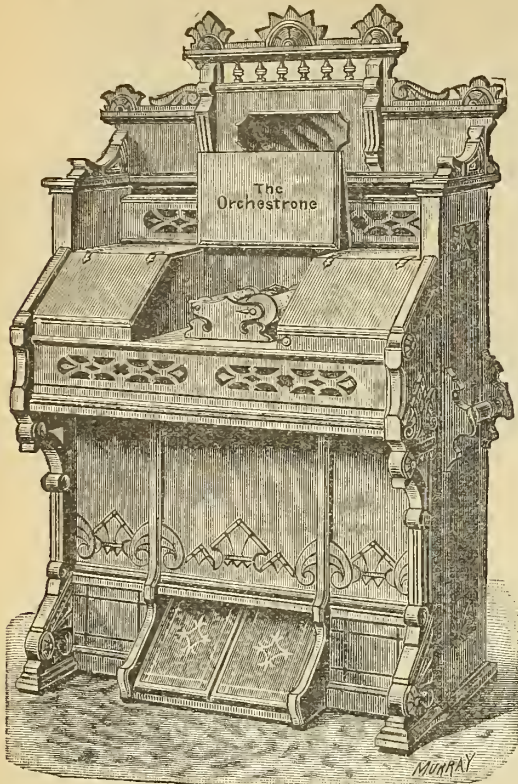
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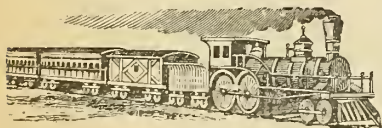
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NOTICE RESPECTING PASSPORTS.

PERSONS requiring passports from the Canadian Government should make application to this Department for the same, such application to be accompanied by the sum of four dollars, in payment of the official fee upon passports as fixed by the Governor-in-Council.

G. POWELL,
Under Secretary of State.
OTTAWA, 19th Feb., 1886.



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Department of Inland Revenue.—An Act respecting Agricultural Fertilizers.

The public is hereby notified that the provisions of the Act respecting AGRICULTURAL FERTILIZERS came into force on the 1st of January, 1886 and that all Fertilizers sold thereafter require to be sold subject to the conditions and restrictions therein contained—the main features of which are as follows:

The expression "fertilizer" means and includes all fertilizers which are sold at more than TEN DOLLARS per ton, and which contains ammonia, or its equivalent of nitrogen, or phosphoric acid.

Every manufacturer or importer of fertilizers for sale, shall, in the course of the month of January in each year, and before offering the same fertilizer for sale, transmit to the Minister of Inland Revenue, carriage paid, a sealed glass jar, containing at least two pounds of the fertilizer manufactured or imported by him, with the certificate of analysis of the same, together with an affidavit setting forth that each jar contains a fair average sample of the fertilizer manufactured or imported by him; and such sample shall be preserved by the Minister of Inland Revenue for the purpose of comparison with any sample of fertilizer which is obtained in the course of the twelve months then next ensuing from such manufacturer or importer, and which is transmitted to the chief analyst for analysis.

If the fertilizer is put up in packages, every such package intended for sale or distribution within Canada shall have the manufacturer's certificate of analysis placed upon or securely attached to each package by the manufacturer; if the fertilizer is in bags it shall be distinctly stamped or printed upon each bag; if it is in barrels, it shall be either branded, stamped or printed upon the head of each barrel or distinctly printed upon good paper and securely pasted upon the head of each barrel, or upon a tag securely attached to the head of each barrel; if it is in bulk, the manufacturer's certificate shall be produced and a copy given to each purchaser.

No fertilizer shall be sold or offered or exposed for sale unless a certificate of

analysis and sample of the same shall have been transmitted to the Minister of Inland Revenue and the provisions of the foregoing sub-section have been complied with.

Every person who sells or offers or exposes for sale any fertilizer, in respect of which the provisions of this Act have not been complied with—or who permits a certificate of analysis to be attached to any package, bag or barrel of such fertilizer, or to be produced to the inspector, to accompany the bill of inspection of such inspector, stating that the fertilizer contains a larger percentage of the constituents mentioned in sub-section No. 11 of the Act than is contained therein—or who sells, offers or exposes for sale any fertilizer purporting to have been inspected, and which does not contain the percentage of constituents mentioned in the next preceding section—or who sells or offers or exposes for sale any fertilizer which does not contain the percentage of constituents mentioned in the manufacturer's certificate accompanying the same, shall be liable in each case to a penalty not exceeding fifty dollars for the first offence, and for each subsequent offence to a penalty not exceeding one hundred dollars. Provided always that deficiency of one per centum of the ammonia, or its equivalent of nitrogen, or of the phosphoric acid, claimed to be contained, shall not be considered as evidence of fraudulent intent.

The Act passed in the forty-seventh year of Her Majesty's reign, chaptered thirty-seven and entitled, "An Act to prevent fraud in the manufacture and sale of agricultural fertilizers," is by this Act repealed, except in regard to any offence committed against it or any prosecution or other act commenced and not concluded or completed, and any payment of money due in respect of any provision thereof.

A copy of the Act may be obtained upon application to the Department of Inland Revenue.

E. MIALL,
Commissioner.

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Director George H. Cook, in the sixth annual report of the New Jersey Experimental Station for 1885 says, "The more difficult the solubility of these phosphates the less their price; while on the other hand it is claimed that under certain and not unusual conditions the lower priced ones will give the largest returns in increased crops. A more useful work could

hardly be undertaken by the experiment station than a series of field experiments for the purpose of testing these claims.

"In the trials begun in 1885 at this station in the case of five experiments out of the eight on different forms, the phosphate being used with potash and nitrogen compounds, the increase of crop was greater with the more insoluble phosphate than with the more expensive superphosphate, and that in three of these five cases the 'floats,' the cheapest of all, did the best work, goes a little way, at least, toward showing that the superphosphate may have had its day."

Mr. W. H. Bowker in his lecture on Homoeopathy and Agriculture," says, "There may be places where insoluble phosphates can be advantageously applied, as upon lands covered with fruit trees or devoted to grass. Perennial plants, like grasses and trees, no doubt extract phosphoric acid more readily than annual plants, owing to their numerous and well developed roots. Winter grains, especially wheat, from the long time it occupies the ground, and its growth in the fall, may also be benefited by an insoluble or partially insoluble phosphate."

Calling attention to these statements, Mr. Ward says that in 1884 more than four-fifths of the cultivated land in New England was comprised in the hay crop, while the pasturage adds a vast acreage. If it be admitted that the crude phosphates are serviceable even to grass alone, an incalculable field is opened for their use.

There is no subject of greater importance to Canada than this one, and it is to be hoped that our Agricultural Bureau will give earnest attention to experiments that may tend to supply our farmers with a cheap and effective fertilizer, easily obtained, pleasant to handle, and inviting confidence by its simplicity. This would render more "protection" to agriculture than can be obtained from any amount of fiscal legislation, and would utilize extensively the valuable phosphate deposits which Canada has the good fortune to possess.

Gold Mining in the Yukon Country.

Dr. G. M. Dawson, Assistant Director of the Geological Survey of Canada, and his assistant, Mr. McEvoy, have returned to Ottawa from their preliminary survey of the Yukon country. Being interviewed with special reference to the gold mining in that vast region Dr. Dawson very kindly gave us the following information:

In the Cassiar country placer mining has been in progress for a number of years, and some very rich creeks were formerly worked. Mining is still carried on, though now largely by Chinese. Quartz veins of considerable size are known to exist in a number of places in the immediate vicinity of some of the paying creeks, but so far no attention has been paid to quartz mining. As this section is of comparatively easy access from the coast and a waggon road could be constructed without

difficulty from the head of navigation on the Stickeen, it seems very desirable that efforts should now be made to test some of the quartz deposits.

East and north of Dease Lake, on the Dease and Liard Rivers, placer mining was some years ago quite remunerative. Still further north, along the Lewis, Pelly and Stewart Rivers—branches of the Yukon—and their tributaries, miners have been working river bars for several years past. The aggregate length of these streams, along all of which gold in greater or less quantity is found, is great, and the total area of the gold producing region which they drain is very extensive. During the summer of 1886 most of the work was done on the Stewart River, but in consequence of the discovery of 'coarse gold' at Forty-Mile Creek—further down the Yukon—nearly all the miners went to that stream this year. Forty-Mile Creek has now been prospected for nearly 100 miles in length, and some rich bars discovered, though the miners unite in saying that the gold is 'spotted,' or unequally distributed. About 250 miners are estimated to have been at work this year.

Asked if the reported hardships and difficulties were adequate to the results obtained by the miners, Dr. Dawson said that while there was undoubtedly much difficulty and many hardships to be faced, mainly owing to the inaccessibility of the country—there being no practical route, and also from the limited working season and the difficulty in working frozen ground when covered with moss and wood, he still had reason to believe that on the average good pay had been obtained, and while numbers were found to speak disparagingly of the results, on the whole he thought that the miners were very well satisfied with the country. He did not think, however, that any other than miners experienced in work on the western coast, men well accustomed to hard work and able to cope with difficulties of no ordinary character should be encouraged to enter the country at present.

Supplies are brought up the Yukon from its mouth in Behring Sea, yearly, by one or more steamers. The trading post now furthest up is near Forty-Mile Creek, but steamers could ascend much further if required. Supplies brought in thus, however, do not arrive till August, which is too late for the summer work of the miners. It is therefore customary for miners to carry in supplies over the Chilkoot Pass and down to the Lewis River. The best way, when possible, is to spend one winter in the country and thus get two good summers work. Little attention has yet been paid to other minerals than gold, but coal has been found on the Lewis, and evidences of copper are frequently met with.

The published maps of the country which at present exist are very incomplete and inaccurate, and though much still remains to be done, the work of Dr. Dawson's expedition will enable a much more accurate delineation of the region.

New Process of Treating Crude Phosphate.

Mr. F. S. Shirley, New Bedford, Mass., and managing director of the grinding mills at Buckingham has discovered a new process by which apatite in its crude state is rendered soluble to a marked degree in water and by which, it is claimed, that the poorer rock which now goes begging can be utilized and made marketable. Mr. Shirley is having his process thoroughly tested by several eminent agricultural chemists and as soon as their reports have been made known they will be communicated to our readers through these columns. The matter is one of vital importance to our phosphate industry and we await further developments with interest.

Our Asbestos Industry.

R. W. Ellis, M.A., L.L.D., Geological Survey, of Canada.*

The mining of asbestos is carried on at several points along the line of the Quebec Central Railway, viz., at Thetford, Black Lake, Coleraine and Belmina. Some work has also been done near Coleraine station. Near Danville, four miles from the Grand Trunk railway, a mine of considerable extent has been operated for several years. As this industry has already grown to large proportions and bids fair to become one of the most important in the Dominion, a brief description of the various asbestos properties, its mode of occurrence, and some facts bearing on the future of the industry may be of general interest.

The various companies engaged in mining asbestos at Thetford are King Bros., the Boston Asbestos Packing Co., Johnston & Co., and Ward Bros.; while at Black Lake and Coleraine are situated the mines of the Anglo-Canadian Co., Frechette's and the Lionais Martin or Scottish Canadian Company's property. These all lie along or near the line of the Quebec Central railway which crosses the property at Thetford, while at Black Lake it is from a quarter to half a mile distant from the workings. At Belmina which is about four miles from the railway at Coleraine station, a small force of men, from six to eight, have been engaged for several years, merely on exploratory work on property owned by Mr. John Bell, of London, England. With a view of acquiring more definite information concerning this valuable mineral, a somewhat detailed examination of all these properties was made in order to render assistance, if required, to any parties interested in this industry.

All the asbestos mines in the Eastern Townships are situated on portions of the great serpentine belts which extend in tolerably direct lines, though with many breaks, north-eastward from the Vermont boundary for some distance beyond the Chaudière river. Further east these peculiar rocks present large areas in the Shickshock Mountain Range, which extends through the northern portion of the Gaspé Peninsula in rear of Ste. Anne des Monts, and further east on the lower part of the Dartmouth river. Though indications of asbestos are found at most points throughout the whole serpentine formation, the developments of this mineral appear, in so far as yet known, to be greatest in the areas about Thetford and Black Lake and near Danville, though there is no apparent reason why it should not be found in paying quantities at other points, and it is prob-

able that subsequent exploration will largely extend the area where profitable mining operations can be carried on.

The serpentines, without going into any detailed account of their mode of formation, may be stated to be intimately associated with masses of dioritic or doleritic rocks, of certain varieties of which, rich in olivine or some allied mineral, the serpentine is in many cases doubtless an alteration product. The serpentines are also frequently associated with masses and dykes of whitish rocks, often composed entirely of quartz and felspar, but at times with an admixture of black mica, forming a granitoid rock. They occur generally not far from the axes of certain anticlinals which exist in the group of rocks designated the altered Quebec Group by Logan. The asbestos traverses the serpentine in veins, often irregular, and which range from mere threads to a thickness of three and even in some cases of six inches, in all of which the fibre of the vein is, unless affected by the dislocations of the containing rock, at right angles to the sides of the fissure. The rock is in many cases somewhat impure from the admixture of grains or small irregular veins of chromic iron, which break the continuity of the fibre in the vein and require the mineral to be carefully 'cobbled' in order to separate these impurities. The veins at or near the surface are also affected by the infiltration of water by which the asbestos is discoloured and its value correspondingly reduced. This is especially noticeable in areas where the surface serpentine is shattered, either by the action of weather or other causes, and this discolouring ceases as the rock becomes solid. As a rule the veins increase in value or quality of fibre as lower depths are reached. Veins are not, however, continuous; the size frequently varies, and like all mineral veins they are affected by faults or slides which often cut off, completely, a valuable working face. In such cases the slicken-sided character is very marked; sheets of impure or imperfect asbestos with long coarse woody fibre lying along the lines of fault. The veins have often the aspect of true segregation veins, and the containing walls often change their character for a distance of half an inch to three inches on each side of the vein. The theory of their formation is however as yet an open question.

Asbestos mining was commenced at Thetford in the year 1878, by what is now known as the Boston Asbestos Packing Company. The demand at that time was exceedingly limited and considerable difficulty was at first experienced in finding a market. The output for that year did not exceed 50 tons, but its value was soon ascertained and explorations on the serpentine belt at this place resulted in finding asbestos in workable quantity over a considerable area.

The Thetford river appears to mark the western limit of the serpentine on these properties, the rocks on the other side of the stream being altered slates and sandstones. To the east of the railway which cuts directly across the area the serpentine forms a knoll with an elevation of about 90 to 100 feet above the track. All the works are confined to this portion of the area and consist of open cuts in the face of the hill, nothing apparently having yet been done to ascertain the value of the area between the railway and the river.

The quality of the asbestos at all the four mines at this place may be stated as excellent. The fibre is fine and readily worked and the veins are, for the most part, especially in the lower cuts, comparatively free from chromic

iron or other impurities, reaching a width of from three-quarters of an inch to four inches, though in some, notably the quarry of Johnston & Co., veins of five or six inches are observed. The fibre in these large veins is not however of such good quality, in so far as yet worked, as that found in those of less size, and veins of one and a half to three inches give as good material as can be wished. Numbers of such veins yielding fibre which ranks as extra first quality are found in all the mines at this place. In some of the cuts these appear as a perfect interlacing network in the surrounding walls and can be counted by the dozen. While all these properties may be said to be about equally productive that of the Boston Company may be especially mentioned both for the amount of its output, which will probably equal that of the three others combined, as well as for the excellent way in which the property has been developed by its experienced manager, Mr. Thomas Sheridan, with a view to successful future operations, and also as illustrating the remarkable improvement in the quality and increase in the quantity of the fibre as the depth increases; a feature clearly established at all the mines, not only in this vicinity but also at Black Lake.

The profitable output of the asbestos is at present apparently only limited by the demand. The amount extracted since the commencement of operations here may be briefly stated thus:—

Boston Asbestos Packing Company, opened 1878, output for 1886, 700 tons. Total output to end of 1886, 3,000 tons.

King Bros., for 1886, say 250 tons, adjoining to north, total since 1881, 850 tons.

Irving Johnston Company, for 1886, say 400 tons, opened since 1879, total 2,500 tons.

Ross-Ward Bros., one quarry, three years only, say 400 tons.

The cost of extraction varies in different localities and depends upon the amount of barren rock encountered, which owing to the action of faults is greater in some cuts than others. It may, however, be safely put down at \$20 to \$25 per ton.

The prices obtained for the asbestos at points of shipments on railways range from \$50 to \$55 per ton for second quality to \$80 or even \$100 for first, a considerable portion of that taken from the lower cuts realizing the latter figures. The markets are Great Britain, Germany, Belgium, the United States and Italy.

The majority of the veins worked range from three-fourths of an inch to two inches and a half. The material is blasted out, carried to the dump, broken up and cobbled by boys and old men, who grade the asbestos, this latter depending upon the colour as well as purity of the fibre, with due regard to its length. The wages paid for labourers in the quarry range from \$1 to \$1.10 per day, and for boys and cobbles, 50 cents.

The comparison of the cost of extraction with the value of the raw material shows a very good margin for profit. The works at this place are, however, carried on, for the most part, during the six months of summer and autumn only, since it has not as yet been found advantageous, in view of the limited market, to undergo the inconvenience and extra expense of continuing operations during the winter. As the market enlarges, however, the mode of working will doubtless adjust itself to the demand. The properties worked at Black Lake are situated on the west side of a steep ridge of serpentine which rises to a height of about 900 feet above the waters of the lake itself.

The three areas are contiguous and from a fourth to a half mile east of the railway. The work is carried on by open cuts in the face of the hill, in all of which veins of excellent asbestos are disclosed, ranging in size up to four inches. The fibre is, in most of these, somewhat discoloured from the presence of water which penetrates the shattered serpentine, and, as a consequence, the greater portion of the output grades as second; but in most of the openings the solid rock is now reached, and the quality of the asbestos is rapidly improving. These mines have not been in operation so long a time as those of Thetford, but the output, which is as follows, show readily the growing importance of this locality:

The output of the Anglo-Canadian (formerly Hopper's mine), for 1886, may be stated at 330 tons, and the total output for the four years, 1,500 tons.

The Frechette mine has been at work only one year, with an output of about 200 tons.

The Lionais-Martin mine, now the Scottish-Canadian Company, has done a large amount of exploratory work. Its estimated output for 1886 may be stated as 250 tons, with a total from the commencement of, say 700 tons.

The cost of mining here varies but little from that at Thetford, and may be stated as averaging \$25 per ton.

In the vicinity of Black Lake several other areas occur, in which the exploratory work done, though not very extensive, shows indications that fully warrant the statement that a valuable and profitable output may be expected. These properties are known as the Reed and Hayden properties, and are situated on Lots 27 and 28, Range B, Coleraine. In various open cuts in the side of the hills numerous veins are disclosed, ranging upward to a width of two and a half inches, with surface indications apparently in no way inferior to those of the adjoining properties now being worked at this place, or even of those of Thetford, not only as to number and size of veins but also as to quality of fibre. These indications appear at many points on both the Hayden and Reed properties, which embrace a total of 200 acres. Between these and Caribou Lake the serpentines extend as an apparently continuous ridge, and show at intervals very good indications of asbestos, but this portion has not as yet been explored to any extent, and but little can be said from actual examination of the value of this section of the serpentine belt, though that it will be found equally productive with the adjoining areas seems reasonable.

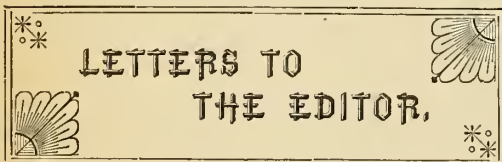
In the vicinity of Coleraine station serpentine also occurs, but the main ridge, extending south-west from Black Lake, keeps to the north-west about one mile and a half, where it forms a conspicuous hill feature. This has been but little examined, but an opening was made on its south-east extremity during the present year by Mr. Kennedy, disclosing the presence of a number of veins of asbestos, one of which had, near the surface, a thickness of nearly four inches. Sufficient work was not done to determine the persistence and value of these veins. An interesting feature in connection with this opening is the presence of mica in considerable quantity in direct contact with the asbestos, a feature not as yet noted at any other point.

The asbestos area of Wolfestown is situated on the north east extremity of a serpentine ridge, which extends south-westerly, with several interruptions from the road leading from Coleraine station to Wolfestown, to the vicinity of Lake Nicolet. It is owned by Mr. John

Bell, of London, Eng., and though a considerable sum of money has evidently been spent on this property it has been largely in the way of explorations. The surface indications, while not equal to those of Black Lake, yet show at several points numbers of veins, some of which reach a thickness of one and a half and even two inches. Only a small force of men is employed, and the property cannot yet be said to be fairly proved. Considerable deposits of chrome iron are found in the hills on this area, which embraces 600 acres. At present it would be exceedingly difficult to give any decided opinion as to the merits of this property. A very fair showing of workable veins has been exposed in the upper part of a deep cut which it is now proposed to intersect at a considerably lower level. Should the same rule of increase which holds at Black Lake and Thetford apply here, there should be good paying ground when the lower level is driven in past the capping of barren rock, provided the veins already disclosed are not cut off by faults, whose presence is noted here as at other points. The total amount of asbestos taken from the Belmina area is about twenty-five tons.

In addition to the properties already described the only other point where this mineral is worked successfully is on Lot 9, Range 3, Shipton, about four miles from Danville on the Grand Trunk Railway. The outcrop of the serpentine is quite limited here, with steep sides all round, and contains a number of veins of asbestos, mostly of small size though the quality of the fibre is good. Faults have affected the value of this property considerably, some very good veins with a thickness reaching two inches having been cut off completely at a depth of 50 feet from the surface. The output, however, is considerable, for the year ending 28th August, 1886, being 450 tons, but from various causes it is at present much less, the mine not being worked to its full capacity.

It will be seen from the facts here presented that the asbestos interests of the province are very important, and judging by the ratio of increase for the last six years will soon assume large proportions. The demand is annually increasing as new uses for the raw material are being found, and from the prospects presented not only at the mines already opened, but in those areas contiguous and which appear equally rich, the supply is practically limitless.



The Utility of Crude Phosphate as a Fertilizer.

48 Congress St., Boston.
1st November, 1887.

The Editor

THE CANADIAN MINING REVIEW:

SIR,—Noting your article in regard to Ground Phosphate and the utility of its application to the soil in its crude state, I feel that the miners and others interested in phosphate do not fully realize the advantages they are losing by inaction and their failure to push their product more into notice, for no matter how advantageous its effects may prove, to be appreciated it must be constantly brought to the notice of the agricultural world, and by persistent trial prove its value so as to receive the endorsement of such recognized authorities

as will vouch for the effective results of its application. I have been informed that some little time ago Mr. R. C. Adams, of Montreal, requested subscriptions for the purpose of introducing this article in the United States, but it was not responded to. Prof. Shaler, of Harvard, has unbounded faith in the utility of the crude material, but requires funds for experiments, and other professors are ready to test its efficacy but naturally feel that as it is the phosphate industry that is to be benefited it seems only fit that those interested in it should be the ones to contribute to the expense, as a small contribution from each would create a sufficiency for the purpose. I trust you will urge its being carried out; if money is lacking let the mine owners contribute the material, say if each mine will contribute from three to five tons of rock and the mill you refer to the grinding, a sufficient quantity would be accumulated to furnish the several United States Experimental stations with a supply for a fair test. Now is the time; for it should be dressed in before winter, and its beneficial results will record themselves next year and soon score a convincing mark that cannot be questioned or rubbed out. Trusting you can enthuse the interested ones.

I am sir, yours, &c.,

F. STACEY SHIRLEY.

Seabury, Que., 9th Nov., 1887.

The Editor

THE CANADIAN MINING REVIEW:

SIR,—We note the remarks in your October number in regard to ground phosphate, and it seems a great pity that the value of this in its crude form, without any acid treatment, is so little known, and more so that some organized effort cannot be made to secure it the attention it deserves, for though the effects on the soil are not so rapid as the high priced fertilizers, the lasting effects obtained are more than an equivalent for its lack of rapidity, especially when the cost is compared, the mild acids formed in the soil and constantly accumulating from atmospheric changes, forming a continuous solvent for it. It is becoming a question with agricultural scientists whether under all circumstances this will not in the long run prove the most profitable when the results are considered against those from high grade fertilizers; for though these produce big results they also impoverish the soil and render their continuous use a necessity, whereas the steady improvement of the soil while giving fair average crops is the proved result of the application of the crude rock when finely ground.

We hope you will use your best efforts to make its value known, for on this depends not only the continued advancement of our phosphate industry but also better and more profitable results to our agricultural community.

The mills here are now idle owing to the low water in the river preventing the shipment of supplies of crude rock, but for this the output could have been readily doubled, as the power from the new wheel put in this season is unlimited, and the new grinders and cleaner lately erected make the equipment complete and ensure most satisfactory results.

Yours truly,

Du Lièvre Milling and Manufacturing Company,
per R. C. Hunton.

Montreal, October 27th, 1887.

The Editor

THE CANADIAN MINING REVIEW:

SIR,—The use of crude phosphate on the soil is a matter of the greatest importance both to the phosphate industry and the country at

large, and it seems improper that we should be compelled to go outside of Canada to gain information on a matter of really national concern. The subject was urged upon Dr. Selwyn's attention last spring, and he stated that he should urge the necessity of making experiments on the Government farms. During the ten years that phosphate has been exported largely from Canada scarcely anything has been done to promote its home consumption, although the worn-out lands of Eastern Canada offer the most urgent opportunity for its use. Two struggling factories have attempted to introduce the phosphatic manures, but the lack of information as to its value has limited their use.

A New England firm writes: "We are doing all we can, without going to too much expense, to educate the farmers of this section to the advantages of using ground apatite, but it is very difficult in the absence of any testimony as to its advisability by known authorities on fertilizers. At the same time we believe that a little money expended in advertising its merits would be a good investment on the part of those interested in mining it."

Your journal cannot do better service than to urge upon the agricultural departments of the Government the desirability of prompt and thorough experiments and the diffusion of knowledge as to the results of the use of phosphate upon the soil in various forms.

It would be wise also for the producers to encourage every possible experiment in the United States, as the northern portions along the lake shore are the natural field for the consumption of Canadian phosphate, and an immense demand must arise there in the future.

Yours &c,

ROBT. C. ADAMS,

Managing Director Anglo Canadian Phosphate Company (Limited).

Improvements in Coal Washing.

In an exhaustive paper on this subject, read before the South Wales Institute of Engineers, Mr. R. de Solderhoff has separated the treatment into three divisions:—(1) Sub-division of coal according to sizes; (2) Washing the coal; (3) Storage and loading of the washed coal. Sometimes also when coal above $\frac{3}{8}$ inch in size has to be used for coking, the coal has to be crushed after it is washed. Also at times when two different kinds of coal are washed, then the mixing takes place after washing, and simultaneously with storing and loading. The apparatus used to sub-divide the coals described are revolving screens, reciprocating tables, and pointed boxes. The washing machines are of two kinds: one to wash $\frac{5}{8}$ -inch to $\frac{3}{8}$ -inch coal, and the other (the felspar washing machine) for washing coal of sizes from $\frac{3}{8}$ -inch to impalpable powder.

Having described the principal elements of a washing plant, the writer gives a description of the very complete and simple plant at the Hohenzollern collieries in Upper Silesia, and the more complicated plant at Dowlais. The washing machinery at the Hohenzollern colliery is situated quite close to the pit, and the whole of the coal is tipped upon two screens placed side by side. The large coal above 3 inches is taken by a Briard transporter and carried to the railway sidings, while the smaller coal drops into a 120-ton bunker placed beneath the screens. From the bunker the small coal is lifted by means of an elevator to the top of the building, where it is submitted to a first

sizing in a revolving screen, which divides it into six sizes.

The first five sizes are washed separately, in five machines ranged on the first floor of the building. After being washed the coal is drained in five short revolving screens, and each of the five sizes is stored in a separate bunker overhanging the railway sidings. The water drained off from the screens is used for steeping the smallest sized coal. This fine coal is separated into five sizes in a pointed trough, and each of these sizes is washed in a separate felspar washing machine. The small coal after being washed mixes together in a trough, which takes it to a cistern from which an elevator with perforated buckets lifts it into the bunkers. The washing machinery is capable of treating 400 tons of coal in ten hours, and requires 32 cubic feet of water per minute. The building is 53 feet long by 35 feet wide and 45 feet high. A horizontal single cylinder engine is employed.

The Dowlais washing plant is of a more complicated character, owing to the machinery having to be erected on a long narrow slip of ground divided by an arched-over incline, and provision having to be made for washing bituminous and steam coal separately. The arrangement therefore comprises two sets of plant—the washing system for bituminous coals, and the washing system for steam coals. The bituminous coal is brought to the Shephard machine, which existed previous to the erection of the new washing machine, where it is crushed by means of rolls. It is then elevated into a revolving screen, which divides it into two sizes—from $\frac{3}{8}$ -inch to 0, and from $\frac{3}{8}$ -inch upwards. The nut coal, from $\frac{3}{8}$ -inch upwards, is raised by means of another elevator into a second revolving screen, placed above the Shephard washing machines. This screen divides the coal into five sizes, which are each washed in a separate machine. After washing, the nut coal is raised by an elevator into bunkers—from which the nut bituminous coal may be discharged into waggons as required. The fine bituminous coal, from $\frac{3}{8}$ -inch downwards, is transported by a current of water along a trough to a revolving screen, which divides the coal into two sizes, from $\frac{1}{4}$ -inch to $\frac{3}{8}$ -inch, and from 0-inch to $\frac{1}{4}$ -inch. The coal from $\frac{1}{4}$ -inch to $\frac{3}{8}$ -inch is washed in two felspar machines placed immediately below the screen, and the coal from 0 inch to $\frac{1}{4}$ -inch is conveyed by a current of water to a pointed trough. It is here divided into six sizes, each of which is washed separately in the felspar machines placed next to the pointed trough. The bituminous coal, $\frac{3}{8}$ -inch and upwards, is sent from the elevator raising the washed coal into a crusher. After being crushed it meets the small steam coal in a bunker situated below the crusher, from which the elevator raises the coals, already partly mixed, to a screw placed on the bunkers erected in front of the crushing department. The screw finally mixes the two coals and distributes them into bunkers, from which the small mixed coal is taken to the coke ovens.

The steam coal is also treated in the new washing arrangement. Arriving in waggons, it is tipped into a bunker, and from there an elevator raises it into a large revolving screen. This screen divides the coal into six sizes, one of which is 0 to $\frac{3}{8}$ -inch, the five others varying from $1\frac{1}{4}$ inches to $\frac{3}{8}$ -inch. The last five sizes are each washed separately in five machines ranged on the ground floor, whence the coal is run off on to five reciprocating tables for the purpose of draining off the water. The dry coal drops into bunkers, whence it may be sent

away in railway waggons. When, however, the five sizes are required for coking, the coal is sent by a trough into a revolving screen, fixed next to the crushers, whence it is taken in a dry state by means of a screw to the crushers. The water draining off, which contains small coal in suspension, coming from the drying revolving screen and the reciprocating tables, returns to the felspar machines.

The fine coal from 0 to $\frac{3}{8}$ -inch, from the large revolving screen, enters first into another revolving screen, which divides it into two sizes, $\frac{3}{8}$ -inch to $\frac{1}{4}$ -inch, and $\frac{1}{4}$ -inch to 0. The first size is washed in two felspar machines, while the second and smaller is carried by water to a pointed trough similar to that used for dividing the bituminous coal. The pointed trough divides the coal into six sizes, each of which is washed in a separate machine. All the fine washed coal in a felspar machine runs together into a large basin, whence an elevator with perforated buckets raises it to the top of the bunkers. This small coal may be bunkered if desired; if not, it may be sent by transporter to the crushing building, where it is re-mixed with the crushed bituminous and steam coals. The overflow of small coal from the small-coal basin runs first into a long trough provided with a screw, and as the small coal settles, the screw brings it back to the common small coal basin, whilst the water runs into settling ponds or clarifiers. The clarifiers are three long pointed troughs, provided with a screw situated underneath. The dirty water, after having passed through the clarifiers, returns to the well of a centrifugal pump, by which it is sent back and redistributed to the washers. The mud, settling in the clarifiers, drops by gravity into the trough of the screw, which transports it to an elevator which raises it and drops it into a bunker.

The Canadian Iron Trade.

By James H. Bartlett, M.E., Montreal.

I desire, very briefly, to call the attention of the Institute to the Iron trade of the Dominion of Canada.

A wonderful development is now going on in Canada. The completion of the Canadian Pacific Railway, and the numerous extensions of the various railways all over the country, combined with the progress made in nearly every kind of manufacture, is drawing attention to the field offered in Canada for the profitable employment of capital, and specially to the opportunity there is for the manufacture of iron.

In a paper presented to the Institute at the Halifax meeting,* the writer gave a review of the various attempts to manufacture iron in Canada. The facts then presented were not such as to offer much encouragement to anyone to embark in similar enterprises under the conditions then existing, but, happily, these conditions are now changed, and an early development may be anticipated.

There are two reasons which make the present time an appropriate one to direct attention to the field offered for enterprise in this direction, the first being the favorable reports of the experts who examined and reported on the exhibit of minerals at the Colonial and Indian exhibition, held in London, England, last year. The exhibits there of coal and iron attracted so much attention that at the request of the Iron and Steel Institute a paper on the "Ironmaking resources of our Colonies as illustrated by the Colonial and Indian Exhibition," was prepared and read at the last meeting of the Institute.

This report of 135 pages is very exhaustive, and the conclusion arrived at, so far as Canada is concerned, is, that she has in many parts of the country every natural facility for the manufacture of iron.

The second and more important reason is the recent change in the Canadian customs tariff inaugurated in May last. The tariff is now generally two-thirds of the American tariff, in addition to which the Government, in order to encourage the manufacture of iron, grants a bounty upon pig-iron made in Canada out of Canadian ore.

The present tariff changes in full are to be found in the Appendix.

It will be remembered that the Provinces forming the Dominion of Canada were only confederated in the year 1867. Previously they were all separate and distinct colonies, each with its own fiscal tariff. After confederation the customs tariff was simply a revenue not a protective tariff, until the year 1879, when an import duty of \$2 per ton was imposed upon pig-iron which previously had always been admitted free of duty; but the iron section of the tariff was still very incomplete. As Canadian iron-workers' wages are regulated by Pittsburgh wages, it is impossible, unless sufficient protection is afforded, to compete with Belgian, German and English manufacturers whose wages are on a much lower scale.

With one single exception all manufactures of iron in Canada have been made with charcoal as fuel. Many of the attempts were made early in the century, when the operations were of very small dimensions. The only furnaces which have been successful have used bog iron-ore and have made only a few tons of iron per day.

The various attempts to make charcoal pig-iron and blooms in the four older Provinces of Ontario, Quebec, New Brunswick and Nova Scotia, have generally met with a want of success. The failures are clearly attributable to want of protection, the sparsely settled condition of the country, want of transportation facilities, and of judgment in the selection of the situation.

The market, as may be supposed, was at the time very limited, as, saving the small quantity of charcoal pig-iron required in making car-wheels, there was no home market, except in competition with imported coke-iron, to meet which was impossible. A variety of experiments have been made, which are counted as failures in the iron manufacture, bringing unwarranted discredit upon this industry. The experiments in many cases were costly, and were undertaken by patentees of all kinds, of no standing or experience in the trade. The only attempt ever made to manufacture coke pig-iron and refined bar-iron has proved the possibility of doing so. The quality of the article is in both cases superior to that imported and commands a higher price.

The importance of the manufacture of iron to the country generally will be appreciated when it is stated that the total balance of trade against Canada from 1868 to 1886 was \$381,000,000. The total value of the imports of iron and steel during that period was \$253,250,000, from which it may be assumed that the balance of trade would have been in our favor, had we made our own iron.

A great bar to the trade has been a want of information regarding the extent of the market to be supplied. This difficulty has been to some extent removed, the writer having collected and tabulated the statistics of the

Canadian iron trade for all the years since confederation, so that it is now possible to see what has been required in the past, and to estimate what will be necessary in the future.

Some particulars of the nature and extent of the Canadian iron trade may be of service at the present time as a guide to anyone desirous of ascertaining facts necessary for the direction of enterprise in this special field. The confederation of the Dominion of Canada took place in 1867, and particulars of the trade only date from then.

The following table will show the Canadian iron trade.

Imports of Iron and Steel and Manufactures thereof into the Dominion for Home Consumption for years.

1868.....	\$ 6,885,365
1869.....	7,385,780
1870.....	7,750,867
1871.....	10,808,645
1872.....	15,913,179
1873.....	25,435,020
1874.....	20,700,387
1875.....	18,199,198
1876.....	12,965,117
1877.....	11,082,321
1878.....	9,398,306
1879.....	7,962,295
1880.....	10,123,660
1881.....	12,955,855
1882.....	17,499,488
1883.....	20,080,274
1884.....	14,790,727
1885.....	11,415,713
1886.....	11,053,365

Total..... \$253,210,512

This large amount of \$253,000,000 was paid out in hard cash by the people of Canada to support the iron industries of other countries. Of this amount \$94,879,630 was free, and \$158,330,882 dutiable.

The value of iron and steel and their manufactures imported into Canada for home consumption during sixteen years, 1868 to 1884, is over \$230,000,000. The trade is divided into seven headings, the value of imports under each from 1868 to 1884 being as follows :

Iron.....	\$75,179,153
Steel.....	9,938,614
Rails.....	43,068,618
Castings and forgings.....	9,703,717
Cutlery and edge tools.....	10,742,331
Hardware and manufactures....	47,926,637
Machinery and engines.....	29,182,414

Total..... \$230,741,484

The imports under the headings alone of iron, steel and rails amounted in 1883 to 328,838 tons, and in 1884 to 273,967 tons; and the annual import since 1875 has averaged over 250,000 tons.

It might be supposed that a very considerable proportion of this weight is due to rails for the Canadian Pacific Railway; but apart altogether from the Pacific rails, there have been on the average over 64,000 tons of rails imported each year for the past ten years.

For a young country with a small population, the amount of iron and steel consumed in Canada is remarkable. In the year 1878 a greater money value of iron and steel was imported into Canada than into the United States; and not making any iron of our own, the value of our consumption of iron and steel, *per capita* of the population, is always many times as much as the value of the imports *per capita* into the United States, as will be seen by the following figures :—

The following table shows the *per capita* consumption of imported iron, steel and manu-

factures in Canada and in the United States since 1868 :

Year.	Canada.	United States.
1868.....	\$2.04	\$0.69
1869.....	2.17	0.74
1870.....	2.25	0.84
1871.....	3.01	1.09
1872.....	4.55	1.30
1873.....	7.01	1.39
1874.....	5.77	0.81
1875.....	5.15	0.46
1876.....	3.46	0.28
1877.....	2.89	0.22
1878.....	2.40	0.18
1879.....	2.00	0.20
1880.....	2.49	0.91
1881.....	2.98	1.00
1882.....	4.05	1.02
1883.....	4.56	0.75
1884.....	3.32	0.60
1885.....	2.28	0.50
1886.....	2.20	0.61

CANADIAN IRON WORKS.

There are in the Dominion at the present time only the following iron works:

Londonderry, N.S.—Two coke blast-furnaces and puddling-furnaces, with refined bar-mill, forge, etc.

Radnor, near Three Rivers, Que.—One charcoal blast-furnace.

Drummondville, Que.—Two charcoal blast-furnaces.

New Glasgow, N.S.—Open hearth steel furnace and rolling-mill.

Halifax, N.S. (one); *St. John, N.B.* (three); *Montreal* (four); *Hamilton, Ont.* (two); *London, Ont.* (one)—rolling mills for re-working scrap and puddled bars, mostly into nail plate.

New Glasgow, N.S. (one); *Hamilton, Ont.* (one)—forges for re-working scrap, mostly into car-axles.

Montreal.—Rolling-mill for making butt-welded pipe; foundry for steel castings.

Toronto, Ont.; Hamilton, Ont.—Foundries for cast-iron pipes.

In Canada, as in the United States, the greatest consumption of iron and steel is created by the construction of railways. When the change from iron to steel rails took place, there were four rolling-mills re-rolling iron rails in Canada, one in Montreal, two in Toronto, and one in Hamilton. The substitution of steel rails, however, caused the mills to suspend operations, their machinery and appliances not being suitable; the mills were dismantled, and the consequent losses have not yet been entirely forgotten. But another and a more recent disaster, namely, the commercial failure of the Steel Company of Canada, Limited, has been most disheartening, effectually dampening the enthusiasm of many believers in the possibilities of the development of our natural resources in this direction. It is hardly to be wondered at that the general Canadian public should lose faith, when an enterprise so brilliantly ushered into existence should only have lasted so short a time, and with such bad results, not only to the shareholders and others financially interested, but to the country generally. When the actual facts are known the reasons of this failure will be plainly seen. These facts are here presented simply with a view to clear the iron industry from this cloud under which it at present rests.

THE LONDONDERRY MINES.

In the forests of the Cobequid Hills, in the Province of Nova Scotia, miles away from any road or settlement, a vein of iron-ore was years ago discovered. Geologists visited the locality and pronounced the deposits of great extent, and a grant of land was obtained from the Government. A Catalan forge was built in 1850, and

three years later a small blast-furnace was put up, charcoal in both cases was used as a fuel, the trees from the forest around being made into charcoal. A small stream ran past the iron mine, and was made to drive the blast-engine. The iron-ore was very pure, so the pig-iron made was of superior quality. There was no home market, but it was exported to England, although the iron had to be carted to the nearest shipping-point, namely, Great Village, six miles away from the furnace, and situated at the entrance to a small tidal river on the Cobequid branch of the Bay of Fundy. Navigation on the upper end of the Bay of Fundy is dangerous; the tides, which here rise to the height of 71 feet, rush in and out with great rapidity; the river could only be entered at high tide by vessels drawing not more than 12 feet of water, and the navigation to the entrance of the river was bad. The construction of the Intercolonial Railway, which eventually was brought within three miles of the furnace (at the expense of permanently lengthening the main line by five miles, and unfavorably affecting the gradients and curvature) made the place more accessible. It was still only a little hamlet in the midst of the forest, but it was self-contained, having plenty of ore and timber for making charcoal. There was a demand for the iron, as, owing to its superiority, the English War Office, upon the recommendation of Sir William Fairbairn and others, were using it for the manufacture of ordnance. This was before the age of steel; no doubt the iron commanded a high price; and, altogether, the works were remunerative to their owners.

In 1873 the Acadia Iron Mines, as they were then called, were purchased by a company of a few English capitalists having Sir William Siemens at their head with a capital of two and a half millions of dollars. Their intention was to make steel directly out of iron-ore by a new patented process, invented by Sir William Siemens, and also to make coke, pig-iron, etc. This company, known as "The Steel Company of Canada," had its headquarters in England and managed the Londonderry business from there. They paid \$400,000 in cash and \$600,000 in paid-up stock for the Acadia iron mines, also \$40,000 for the patent rights, a total of \$1,040,000.

The accidental location of the little charcoal blast-furnace seems to have given rise to the choice of the situation for the new works. It would be different to account for the selection in any other way. Works specially designed for the new patented process, with rotators, regenerative melting furnaces with gas-producers, two blast-furnaces, branch railways to the Intercolonial Railway and the different ore-mines, houses, buildings, etc., etc., were built. The scale on which the expenditures were made can be best understood by reference to the item of cost for the manager's house, which came to \$40,000.

The works were completed and got into operation, probably at a further expenditure of about \$1,250,000. The new process did not seem to do very well; and after costly experiments, and repeated trials, it eventually proved here as elsewhere, a complete failure. Hundreds, perhaps thousands, of tons of expensive machinery had to be broken up, and the melting furnaces and gas-producers were pulled down. A second-hand rolling-mill was purchased, some puddling furnaces were built, an axle-forge with a foundry for car-wheels and general castings were added, and the products of the works was changed from steel to pig-iron, bar-iron and castings. The place was not now

self-contained, as before; charcoal was no longer the fuel used, so the trees were of little use, except for timbers in the iron-mines. What was wanted was coal and coke; and, although at the time of the purchase coal was supposed to be on the property, it has never yet been actually discovered. The coal-field of Pictou is 51 miles to the eastward, that of Cumberland 34 miles to the westward. Limestone in considerable quantities is required, and is obtained from Brookfield, 25 miles to the eastward. When, after having paid freight on all these materials, iron is made out of them, there is no outlet but by the same Intercolonial Railway, the distance by rail to Montreal being 773 miles.

This condition of affairs was bad enough; but the situation was made much worse by the fact that the company had never built any coke-ovens of its own, and that, at this time, only one colliery mined a coal suitable for coking, and also owned the only coke-ovens in the country. This colliery, consequently, supplied coke at its own price, helping materially to kill the goose which laid the golden egg. One day, an explosion took place in this particular coal-mine, set the mine on fire, and closed it. It has been closed ever since, but is now being opened again. For a time coke was not to be had, at any price; the blast-furnace had to be shut down, and the loss, from this cause alone, can be better imagined than described. After this experience, some coke-ovens were built, and to some extent this has made the company independent. Finally, a coal mine was purchased and fully equipped; but, upon practical trials, the coal was found to be to a considerable extent unfitted for the company's uses. It was also discovered that, through an arrangement to have the iron-ore mined by contract, the contractor had made money for himself, but had permanently injured one of the iron mines.

Instead of running a general store, from which a considerable revenue would accrue, some outsider was granted the privilege, and took advantage of it.

It is not surprising that, after all the vicissitudes, and in view, also, of the fact that until 1880 imported pig-iron was admitted free of duty into Canada, the company failed. It is more to be wondered at that the struggle was maintained so long.

In 1880 an import duty of \$2 per ton was imposed, and in 1883 a bounty of \$1.50 per ton of pig-iron manufactured out of Canadian ore was granted by the Dominion Government. Under these improved conditions, the company's operations were continued by the liquidators. Since the change in the tariff, a reorganization has been effected. The management is now centered in Canada, and the enterprise will no doubt be made productive to the proprietors and the country at large. Under a careful management, there can be no question that a satisfactory dividend can be earned upon the expenditure of the works as they stand.

It is manifestly unfair to condemn every projected iron-making enterprise in Canada simply because, in the past, this particular case has not succeeded. In spite of all their troubles, the pig-iron, bar-iron, and other products of the Londonderry works, have been of a very superior quality, and have always commanded the highest price in the market.

RESOURCES OF NOVA SCOTIA AND OTHER PROVINCES.

In almost every Province iron-ore is found in abundance, and the Provinces which have not coal have an abundance of timber fit for making charcoal. We possess the only deposits

of coal on both the Atlantic and Pacific shores; in Vancouver's Island and Cape Breton the coal seams run out under the ocean. In both these Provinces, British Columbia and Nova Scotia, nature has been prodigal with deposits of various descriptions of iron-ore of very good quality, and with plenty of flux, all in the immediate vicinity of the coal fields.

There are now a number of collieries mining a good coking-coal in Nova Scotia; and the railway construction now progressing there will bring an unlimited supply of fuel within reach of all parts of the Province.

In the county of Pictou, N.S., iron, coal, and limestone are found in the closest proximity; within a radius of ten miles there is everything necessary to build up a great and successful industry; and this mineral wealth is found on the seaboard, so that the products of the industry can be cheaply transported by water to the head of Lake Superior, if required; several descriptions of iron-ore are found in this county. There is specular iron-ore, with 68.33 per cent. of metallic iron; compact limonite, with 57.71; fibrous limonite, with 59.50; red hematite, and also fossiliferous hematite, with 54.36, and spathic ore, with 43.56.

(To be continued.)

OUR LADY FRIENDS will be interested in knowing that by sending 20c. to pay postage, and 15 top covers of Warner's Safe Yeast (showing that they have used at least 15 packages) to H. H. Warner & Co., Rochester, N.Y., they can get a 500 page, finely illustrated Cook Book, free. Such a book, bound in cloth, could not be bought for less than a dollar. It is a wonderfully good chance to get a fine book for the mere postage and the ladies should act promptly.



Phosphate shipments from Montreal to November 15th, 1887:—

Date.	Shippers.	Ship.	Destination.	Tons.
Sept. 27	Lomer, Rohr & Co.	s.s. Cascapedia	Norfolk. . .	274
" 29	Wilson & Green.	s.s. Oxenholme	Liverpool..	304
" 29	Anglo-Can. P. Co.	do	do	260
" 29	Gilliespie Paterson	do	do	54½
Oct. 5	Anglo-Can. P. Co.	s.s. Panama....	Hayre	210
" 6	Lomer, Rohr & Co.	do	do	100
" 13	"	s.s. Concordia	Glasgow..	200
" 15	"	s.s. Colina....	do	220
" 15	"	s.s. Grassbrook	Hamburg..	462
" 28	Wilson & Green.	s.s. Harbinger.	London....	498
" 28	Lomer, Rohr & Co.	do	do	175
" 29	Millar & Co.	s.s. Euskaro...	Liverpool..	95
Nov. 10	Lomer, Rohr & Co.	s.s. Cynthia...	Glasgow..	95
" 10	"	s.s. Thorndale.	London....	300
" 10	Millar & Co.	do	do	80
" 12	Anglo-Can. P. Co.	s.s. Khrwieder	Hamburg..	355
" 12	Wilson & Green.	do	do	566
" 11	Lomer, Rohr & Co.	s.s. Toronto ...	Liverpool..	160
Total....				4,408½

The price for 80% phosphate continues firm abroad, and a sale has been made to a port on the west coast of Great Britain at a shilling and a farthing. One shilling per unit with ½d. rise is the quotation for 80% in the principal ports. Cable offers for ground phosphate have been received at 8d. per unit with ½ rise for 60%, and 10½d. per unit with ½ rise for 70%. Prices are also quoted at Buffalo and Chicago at \$10 per ton for 65% ground in bags. These enquiries show that the much desired demand for ground phosphate is increasing. English prices for the

lower grade crude phosphate remain at last quotations, 9d. for 70% and 10d. for 75%, both with ½d. rise, which is some advance over the ruling prices for the season. The sale of the grades has been somewhat hindered by competition from French phosphate and by offerings of Aruba phosphate at 8½d. for 70%.

The shipping season as usual closes with higher rates, as shippers do not like to carry stock over winter and therefore submit more readily to the demands of vessels. Rates to Hamburg were 15s. per ton; to England 10s. to 12s. 6d. direct, or 6s. 3d. via Southern cotton ports. The low water in the Lievre River has kept back a considerable quantity of phosphate which might otherwise have been shipped. The completion of the canal is eagerly looked for.

The reprehensible system by which large numbers of valuable phosphate properties are acquired, and held undeveloped by speculators, is severely commented on by the *Canadian Trade Review*, which in a recent article says:—

"The manner in which the phosphate racket is worked ought to have the attention of the Provincial Parliament when it next assembles, and the question might be considered whether it is not in the public interest to make such provisions that those who have mining claims and refuse to turn them to some practical advantage to themselves and the public should within a certain specified time be compelled either to work them or surrender them on payment of a royalty—to themselves and the province,—to such parties as may make *bona fide* offers to operate them. This locking up of one of the provincial resources out of which a public revenue is derivable ought not longer to be tolerated in the interest of mere speculators, who have at present every thing to gain and nothing to lose by their delay."

Two eminent United States scientists, in a report on phosphate deposits at present under consideration, have given an extended discussion to the question of the utility of crude phosphate as a fertilizer. When their studies are completed we are promised their report for publication in these columns.

Du Lievre District.

Operations are being conducted on a very much reduced scale at the Little Rapids Mine. The men are principally employed cobbing the ore.

Over 90 men are working on the new lock and dam at this point. The length of the lock is to be 135 feet, and it is thought the work will occupy a little over a year before it is completed.

A new cobbing house is being erected at the Union Mines, the lumber for which is being drawn from Holland's mills.

News reaches us from the North Star Mine that everything there is highly satisfactory. Mr. J. F. Higginson states that the last shipment has been made for this season. Capt. Williams states that the new boiler and machinery which has lately been put in proves very satisfactory and works well. He is making preparations on the wharves for his winter's drawing.

The Emerald, North Star and Union Companies have managed at last to get their output down the river. They have suffered much inconvenience from the low water.

The High Rock Company have supplied about 6,000 tons of phosphate, and there are about 4,000 tons remaining which the management have been unable to send down. A new

cobbing house 45x30 is being built which will make the tenth now on this property. Something like 170 men are constantly employed at this mine, which is one of, if not the best, on the Du Lievre.

Shipping on this river is gradually ceasing. Two mines have already finished their season's work, but one or two seem determined to push their produce through as long as they can.

Wakefield.

On the property recently acquired by Mr. W. H. Fuller, Ottawa, a pit has been sunk to the depth of 80 feet in a highly felsphatic rock enclosing some veins of a grayish-green apatite, portions of which are comparatively free from inclusions. Other portions of the veins, however, are somewhat mixed and require hand cobbing to make it at all marketable. This lot, together with some small pits on lots 17 and 18, in the 2nd range, will probably have yielded by the spring about 200 tons, including a first and second quality.

Kingston District.

At the property of Captain Boyd Smith, at Eagle Lake, there has been shipped to Kingston during the season about 1,800 tons of No. 1 phosphate, of which about 1,500 tons have gone to Montreal by barge, and the balance to Philadelphia. Any further shipments will go to the phosphate works at Philadelphia. The seasons output will average 85 per cent.

The No. 2 ore will be kept for shipment to Chicago and other Lake ports on opening of navigation next spring. Besides this there has been mined ready for market an amount of magnetic iron ore, in stripping veins and leads, and in prospecting for and mining phosphate, some 500 tons of which will average 65 per cent. This has been mined and saved at a mere nominal cost, as it was generally one of the walls of vein matter and would have to be taken out to make room for the mining of the phosphate along side of it, for, strange to say, both iron and phosphate are part of each other. Much more work would have been done this season but for the scarcity of efficient hands. Most of the miners in this section being employed at high wages by the new iron companies on the line of the K. & P. Railway.

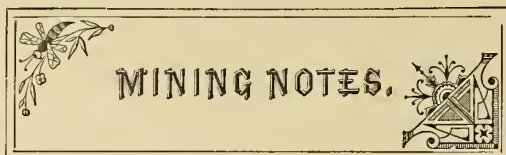
Mr. Joseph Harris, superintendent of these mines, writes:—

"Until now we claim to have the best organized force for its size, and to be getting out the cheapest mined and highest grade No. 1 phosphate of any phosphate mine in Canada. This is in great part on account of exceptional cheapness of cobbing, owing to freedom from mica, pyroxene, rock and pyrites, or, in fact, any foreign matter (vide the report of Dr. T. Sterry Hunt), while for the markets of the United States we are so placed as to have a fair profit, in the difference of freights alone, in our favour. The phosphate, too, does not occur so much in bunches or in irregular quantities as elsewhere in Canada; but in regular leads or veins which can be depended upon for regular mining work."

On account of the scarcity of efficient hands there has been little work done at the St. George's Lake mines. There are some 150 to 200 tons of high grade No. 1 there to be shipped next season.

During the winter there will be employed on both properties between 50 and 60 of the best men sufficient to run a large force, and accommodation for these is being provided in the comfortable houses being erected. Cornwall miners and their families will be brought out and every endeavour made to mine and handle

from 4,000 to 5,000 tons of high grade ore, or more, should the market justify it. Captain Boyd Smith is of the opinion that the best market for all his output will eventually be found in the United States.



MINING NOTES.

Nova Scotia.

A preliminary meeting for the purpose of organizing a gold miners association was held at the *Critic's* office on Wednesday afternoon, the 9th instant. After some discussion on the necessity of such an association the meeting adjourned for permanent organization on Tuesday, 6th December.

Mr. Kamper, of the German Syndicate which contemplates establishing iron works upon an extensive scale in this Province, has recently stated that he and his associates are prepared to invest three or four thousand dollars in that enterprise provided the Government's fiscal regulations are favourable and the quantity and quality of available iron come up to their expectations. The syndicate manifestly intend operating on an extensive scale, for, everything being satisfactory, they contemplate turning out from forty to fifty thousand tons of iron per year and supplying all the steel rails that the Canadian market requires. The syndicate have engineers engaged making the necessary inquiries and experiments and will ship some hundreds of tons of iron to France to be tested there.

Quebec.

Very satisfactory reports continue to be received from the Wright Silver Mine at Lake Temiscamingue. Arrangements are being made with the Temiscamingue Railway Company to carry the ore eastward. The management expect to ship ore every week next summer.

A local exchange says:—There is talk of William McVeigh making a sale of his iron mine, which is situated at the end of the Grand Calumet Bridge. Another mine has been struck three miles east of here and is supposed to be rich. We think that the railway company will yet build a branch line here, if not a loop connecting Bristol Iron Mine, the McVeigh and all the other rich surroundings.

Mr. S. P. Franchot, reports that everything at the Central Lake Mine looks well, and we may look for great things from this new mine next season; the shows on the property are really fine and look to be of a high grade ore.

Work on the Hamilton Powder Co.'s new magazine is going ahead, and when completed will prove a boon to the mining community, who have long felt the want of such on the river from which they could obtain their blasting material without having to send to Montreal for it and very often experiencing great delays in transit. The magazine is a step in the right direction.

There is nothing very new to report in the matter of the recent find of gold on the property of Captain Bothwell. Several miners are at work and a ton or two of the ore is to be barrelled up and sent to England for treatment. The Captain states that he has certificates of

several analysis, which have since been made and which have all shewn gold in more or less quantities. He promised to send us copies of these certificates for publication, but up to the hour of going to press they have not been received. Despite the fact that assays made from specimens taken by uninterested parties from the pit, and made by Dr. Donald, of Montreal, and Dr. Hoffmann, of the Geological Survey, have been found void of any trace of the precious metal, Captain Bothwell has every confidence in his mine, and feels sure that he will soon be in a position to remove the doubts that are expressed by those skeptical of the value and importance of his discovery. The latest specimens of the ore shown us are certainly of a totally different character and of a much superior quality to those submitted when the discovery was first made public.

The Nailon property, one of the adjoining lots to that of Captain Bothwell's, has been purchased by a syndicate of four Buckingham gentlemen and is being worked for gold. The indications are reported encouraging.

The Graphite City Plumbago Mill is being put into thoroughly good shape, it being the intention to commence operations again there next summer. It presents rather a difficult job as the entire building 100 x 40 has to be raised in order to insert new timber and posts, however, under the superintendence of Mr. Chas. Devenney the work is pregressing satisfactorily.

Mr. Thomas Daley, of Upper Wakefield, has struck a valuable vein of the clearest mica, together with one of iron and another of stone suitable for porcelain, on lots 19 and 26, Portland Township, which he recently purchased. These mines are pronounced by an expert to be ones that will pan out handsomely.

Reports of an unusually busy season reach us from the mica mines of the B. & C. M. & M. Co., at Villeneuve. At present there is a very large demand for the product of the mine both in Canada and the United States, and in order to meet this two steam drills and a staff of forty men are kept hard at work both night and day. Work on the old pits has been stopped for the present, and slicing the hill from the outside is now being conducted on two beautiful seams of Muscovite of a very superior quality. The business has increased so much within the past few months that it has been found necessary to remove the hands employed in cutting, cleaning, sorting and packing the mica from Buckingham to the mines, where increased accommodation has been provided. This will greatly facilitate the handling of the product. Mr. Key, the mine superintendent, did not give satisfaction, and he has been superceded by Mr. Neil Cochrane, a miner of considerable experience. A market for ground mica has been found in Cleveland, Ohio, where it is used for lubricating purposes, and for this, large quantities of the waste product are being utilized. Pure white feldspar entirely free from iron or other deleterious impurities is found in large quantities on the property, and the management have good reason to believe that this will be utilized in the pottery manufacture. Dr. Stackhouse, of Ottawa, has made a report on specimens submitted to him, and states that for dental purposes alone the feldspar will prove of great value. Already several orders have been filled for Canadian dentists. The amount of

cuttable mica shipped for the month ending the 15th was over 3,400 tons.

Messrs. J. & C. Russell have lately put in some working plant at their silver mine on Calumet Island. Before winter sets in several car loads of the ore will be shipped to New York and Philadelphia where it will be smelted, and upon the results and expense of this operation will depend very much whether operations are to be resumed next season.

Ontario.

The two calcining furnaces at the Bristol Iron Mines are nearly completed, and the gas producer will be finished in the course of a fortnight. A cargo of gas producing coal is already on hand when roasting work will be commenced and about one hundred tons will pass from the mine through the calciners per day. A very convenient skip and self-dumping iron car is completed which will convey the ore direct from the bottom of the pit to the furnaces. The stock pile having become inconveniently large, mining was suspended for a time in order to make but one handling of the ore, which will now be done entirely by machinery. The company have not as yet settled the question as to whether the ore will be shipped the coming winter by the Brae Side, C.P.R., or by the P.P.J. railway.

Mr. E. B. Haycock, who has been prospecting all summer in the Temagamingue district, has returned to Ottawa. He has been successful in securing some very promising locations bearing rich indications of gold, silver, copper and asbestos. An assay of the copper specimens by Dr. Donald, Montreal, has given a very high percentage of copper while others, examined by Dr. Hoffman, have been spoken of very favourably. Mr. Haycock will sink a shaft on some of these locations next season, and upon the results then obtained will depend the extent of further operations.

The Victoria Galena mine, near Sault Ste. Marie, has done nothing this year, the management awaiting the completion of the railway and bridge at Sault Ste. Marie.

With reference to the very rich discoveries of gold reported within the past month from the Sudbury district our correspondent writes: "Several claims of gold discoveries are reported in this vicinity, that is from six to thirty miles distance from Sudbury. Some are quartz bearing gold, others are veins of quartz with iron and copper pyrites containing gold to a certain extent. The most important gold bearing quartz discovery has been made by Messrs. Tough & Company, at a point about twenty miles from Sudbury. I have seen some specimens showing free gold taken from the surface of the rock at a height of over one hundred feet and others from a lower point near the level of the ground. The mineral can be seen in a great many places in quartz veins running through the rocks. Some blasting has been done for specimens for the assayer and free gold was taken out with each shot. Mr. J. Heys, of Toronto, who made the assays, was here about ten days ago and informed me that an analysis of the specimens gave from \$40 to \$7,000 to the ton. Assays from discoveries made by different prospectors have shown \$200 per ton for good specimens, and from \$30 to \$100 for some inferior quality of quartz. Experts pronounce the discoveries of immense importance, while such as have gone over the

Tough property state that they have never seen richer indications. Agents of New York and Chicago capitalists are at present in Sudbury with the object of purchasing the Tough mine. Current gossip has it that one and a-half million dollars is wanted for it. No doubt a good round sum will be required before a purchase can be carried through. Messrs. Tough's location covers about one square mile. Other locations have been made under the Mining Act. Good strong energetic company's will find investments that will pay in this district."

The Bedford Mining Company has been organized with a capital of \$250,000 to mine iron and other metals at Bedford, near Kingston. The incorporators are Sir Richard Cartwright, Hon. Alex. Morris, Wm. Morris, John D. Hower, Benjamin W. Folger and others.

A meeting of the Elgin Silver Mining Company has been called for November 8th, when the business of the company will probably be wound up. The mines, located at Jackfish Bay, Lake Superior, have been experimentally worked by the company for several seasons past at an expense to the shareholders of about \$10,000.

It is reported that Mr. Adam Burwash, Mattawa, has gone to England with the object of floating a company to work the gold said to have been found in that vicinity.

The Port Colborne Natural Gas, Fuel and Light Company have sunk its well at Port Colborne to a depth of 150 feet and has obtained a supply of gas of extra quality sufficient for lighting and for all the fuel they can supply. The greatest flow was at 800 feet.

Port Arthur District.

At the Beaver Mine sinking in No. 2 shaft has been started again—the shaft being still in silver. A wing on the lower level, 150 feet north of the shaft, is also going down. Drifting north on the middle drift has been commenced, and the stoping in the upper portion of the mine of the same quality of rich ore, still continues. The organization of the company still goes on, and Mr. W. H. Furlonge has finished his underground surveying and sampling. A one-quarter interest has been recently purchased in this property by Gov. Alger, of Michigan, and a one-twentieth interest by another Michigan gentleman.

Sinking the main shaft of the Rabbit Mountain Mine still goes on with unabated vigour, and they are nearly 300 feet deep now; they will drift to the south as soon as the 300 feet level is reached. The bottom of the shaft is looking well, and in it some of the decomposed magnesian silicate so rich in the Beaver Mine is now being found. The drift on the 250 foot level to the north is looking as usual.

The reported sale of the Porcupine has not been effected, and the property is consequently lying idle.

Due south of the Porcupine, and only a short distance away, is a very promising prospect—The Badger. An adit is now in some 200 feet, and some very rich ore is extracted. The vein is, however, left standing so that the value is only ascertained when they break into it.

A reported very rich strike at Silver Mountain lacks confirmation, but at least development is going ahead steadily and mill rock is constantly being extracted.

R. 230, situated north-west of Whitefish Lake, is being systematically opened up, and some ore, unsurpassed anywhere, is being taken from two shafts upon it. Other properties on this vein also show silver, and altogether this part of the district bids fair to come to the front in a short time. Numerous other veins are being prospected with greater or less success in a small way, and enquiries by capitalists are coming from everywhere.

The Attick Lake mines, located about 25 miles south-west of the Beaver, and which are also in the slate formation, are showing up very favorably. There are now four veins opened on locations E 19 and R 238, varying from three to seven feet in width. Two of these veins are of exactly the same character as that of the Beaver vein, and much better indications of silver than that which the Beaver vein showed at the same stage of development. Some further developments are now being made at the junctions of these two veins, on location R 238, owned by W. A. Allan, of Ottawa. At this point, the spar and vein matter is about 12 feet wide, showing both native and leaf silver within two feet of the surface.

There have been a good many new locations taken up in this neighbourhood within the last four months, but so far very little work has been done owing to the difficulties in getting in supplies, there being no waggon road within 20 miles; but this obstacle will soon be removed, as the Port Arthur and Duluth Railroad, which is now in course of construction, will pass close to Attick Lake.

Rat Portage District.

Mr. A. C. Lawson, of the Geological Survey, has returned to Ottawa from his season's work in this region. He reports abundant evidence of gold at Manitoulin Lake, where it is found in quartz veins carried by a green slate formation. He also reports an immense iron bed at Hunters Island, Lake of the Woods, and the discovery of silver and other economic minerals at various points.

Work will be started almost immediately on 211 P., Clearwater Bay, Lake of the Woods, on two very promising gold veins owned by Mr. Dounais, of Port Arthur. No mining is now going on in this section, though the opening of the Gold Hill Property on a large scale, next spring, is now assured.

Manitoba and North-West Territories.

A company called the Calgary Mining and Smelting Company are making application to the corporation of Calgary for a bonus of \$10,000 with a view to the erection of smelting works at that place. The company own the Carrilton location situated upon Mount Stephen, near Field, B. C., containing a vein of galena ore carrying silver extending along the full face of the location, 1,500 feet. The company propose to smelt the ore from their own mine as well as ore from the other mines in the district.

In a three days competitive test of the Canadian Anthracite Company's coal made recently in San Francisco, results of a highly satisfactory character were obtained. It is expected that by the new machinery now being put in

the output of the mine will be increased to 250 tons per day. Large shipments are now being made to San Francisco and San Diego.

The following analysis of this coal was made by C. A. Luckhardt, of the Nevada Metallurgical Works, San Francisco :

Fixed Carbon.....	81.06 p. c.
Volat. Carbon, &c.....	11.31 "
Moisture, &c., 212.....	0.90 "
Hygroscopic Water.....	1.00 "
Sulphur.....	0.77 "
Ash.....	4.96 "

100.00 "

Ash contains :

3,402 Silica.
1,257 Oxide of Iron and Alumina.
0,269 Lime as Oxide Calcium.

4,928 per cent represented.

Specific gravity..... 1.417

An Order-in-Council has been passed on the recommendation of the Minister of the Interior, and under the provisions of the "Act respecting Public Lands," correcting the regulations of the 7th March, 1884, with respect to the disposal of mineral lands, other than coal lands, in Manitoba and the North-West Territories, and of such mineral lands in British Columbia as are the property of the Government of Canada. Generally, it may be said that the few changes in the mining regulations have for their object the assimilating of the system of administering mining lands within the railway belt in British Columbia with the mining laws of that province, adhering, however, to the principle that the purchaser of mining lands shall acquire the right to such mines, minerals, and substances as may be found within the boundaries of his claim produced vertically, but not the right to follow the lead or vein of gold or silver bearing quartz, which originated in his own claim, outside of those vertical lines, as is the case under the ledge or California system, which prevails in the province.

An anthracite coal mine is being opened near Canmore by a company organized by Mr. Brickendorf.

The Canadian Anthracite Coal Company have had an engine and boiler and a considerable amount of new machinery recently put into their property.

British Columbia.

Reports from the Illicillewact mines are very good. The company are making regular shipments of silver ore to Omaha and to the Silby Smelting Company in San Francisco. The ore bodies are increasing in thickness as they penetrate the mountain and it is now an established fact that the mineral belt extends for two miles in a straight direction. The ore found is rich in lead and silver, and is very desirable for smelting. In some of the company's mines, a drier and richer ore is found assaying up into the hundreds. The company are extracting ore from four or five mines, and all paying largely over expenses. They feel confident that they can in another season supply a forty ton smelter. Limestone and iron ore for fluxes are to be found in the immediate vicinity of the mines. The shipments now are one car load per week.

Alaska.

James McAdams and four other miners who have been working all summer at the new diggings at Forty-Mile Creek have returned to San Francisco. They are the first to reach this point from the new diggings, about whose

reputed richness much has reached Californian papers at odd times by the telegraph from Victoria. McAdams is one of the discoverers of this district, and Mulheim has been in these wilds for the past two years. The latter says : "About 100 miners came out with us. Some have made as high as \$1,000 this season, while others were broken. The average was from \$200 to \$500 each. The thermometer falls to 80 degrees below zero up there. The ground is thickly covered with moss and is frozen for the year round. It is the most fearfully wild country. I would not advise any body to go to this region. I don't think people would be justified in doing it. It has been greatly over estimated."

MISCELLANEOUS PARAGRAPHS.

Value of Manganese Ore.—In response to numerous enquires Messrs. Ledoux & Co., New York,† mention the following uses for which manganese is available:—The First. Chemical use. The demand for this purpose is comparatively small, all Europe taking not more than 10,000 tons per annum, of which 4,000 tons goes to Liverpool. The price varies from 10 pence to 12 pence per unit of peroxide per ton of 2,240 lbs., the principle thing being, first, that the ore shall run as high as possible in peroxide and that it shall contain no carbonates. Second. Metal use. For metal use an *ideal* manganese ore should contain not less than 50 per cent. of manganese, not more than 0.10 per cent. of phosphorus and not over 10 per cent. of silica. Carbonate of lime present is an advantage; copper decidedly objectionable if over 0.15 per cent., while nickel and cobalt should be absent. Two good shipments, highly praised by the English metal men as to quality, recently analyzed as follows :

	No. 1.	No. 2.
Manganese.....	53.85	51.35 per cent.
Silica.....	7.29	4.00 "
Phosphorus.....	0.04	0.01 "
Carbonate of lime.....	4.00	11.79 "

Manganese ore for metal use is worth about 1s. 4d., with 1d. per unit deducted if the silica runs over 14 per cent., or the phosphorus over 0.13 per cent. The present system of payment is generally, first, an advance of 75 per cent. of value through New York bankers against the bills of lading, balance on the confirmation of the analysis by the buyers or some independent chemist. You will notice that I give only English quotations, the American market being in the hands of one or two buyers only, who pay whatever price they have to, without reference to any standard schedule. Like all English metal dealings there a great many deductions and charges difficult to understand here. For example, a shipment of 100 tons ex steamer from Norfolk, Va., sold in Liverpool as follows: Cr. *By sale*, agreed analysis: Manganese, 50.00 per cent.; moisture, 2.00 per cent.; 100 tons, less 2. moisture, net 93; 1s. 3d. per unit of metal, £3 6s. 8d. per ton, £336 13s. 4d. *Charges.*—Marine insurance, £300 at $\frac{1}{2}$ per cent., £1 10s.; sea freight, at 8s. per ton, £40; sampling, at 6d., £2 10s.; analysis fee, 21s., preparing sample, 10s., £1 11s.; commission at $2\frac{1}{2}$ per cent., £8 8s. 4d.; total charges, £53 19s. 4d.; net proceeds, £282 14s. The only things in this account of sales that interest the shipper are the weight, assay and net returns. From this we will see that his 100 tons of 50 per cent.

ore brought him £282 14s., or \$1,371.09, being \$13.71 per ton of 2,240 pounds.

Copper Mining in Michigan.—"Comparatively few," writes C. D. Lawton, Commissioner of Mineral Statistics, "comprehend the scale on which all the work is carried on at our great copper mines. They do not realize the fact that the rock from which the copper is eliminated must be mined far underground at a depth of from hundreds to thousands of feet, and thence raised to the surface, taken to the rock house and passed through breakers, whence it must go to the stamp mill—perhaps several miles away—and there it must be pounded into fine mud and sand, which in turn is run over a system of sieves, jiggers, and slime tables, undergoing an elaborate process of mechanical separation of the copper from the sand, after which the copper must be taken to the smelting works, and then cast into ingots, when it is ready to be sent to the market." Then Mr. Lawton in enumerating the expense of reduction says that "Few, even mining men, who are not acquainted with the details of the work at our Michigan copper mines are ready to give credence to the statements that rock which has a gross value of but \$1.65 per ton, or less than 15 pounds of refined copper, on an average, to the ton, can be mined at a depth of more than 1,000 feet below the surface, hoisted, broken, stamped, washed and separated, smelted, and taken to a market and sold, and still leave a net profit of 22 cents on every ton. Yet this was the year's result at the Atlantic mine in 1885, is equally favourable for 1886, and the company paid a dividend of one dollar per share to the shareholders. In order to accomplish this, 800 tons of rock were raised and stamped per day. Each year, as the price of copper has diminished, the daily production has been increased, in order to reduce the average cost. Ten years ago, when there were but 230 tons of rock mined and treated per day, the average cost was \$3.90 per ton at this mine. The cost of stamping and washing was then 88 cents per ton, while now it is but 30 cents. The total average cost per pound of copper obtained at the Atlantic mine ten years ago was 22 cents, in 1885 the same was produced for $9\frac{1}{2}$ cents. The mine is no richer now than formerly, in fact, there has been, practically, no change in the quality of the rock. The advantage gained is due to improved facilities for mining and manipulation, and to a better comprehension of the work."

Chlorination of Gold-Bearing Sulphides.—Mr. E. Gybbon, Spilsbury,‡ New York, gives the following description of a novel method of chlorination:—The chlorinator consists of a plain iron barrel lined with lead, and provided with a manhole on one side for charging and discharging the ore. The ore is charged in one-ton lots. The barrel is first partially filled with water; then a sufficient quantity of chloride of lime is dropped in, on top of which the roasted ore is charged. On top of the ore is poured the requisite amount of sulphuric acid, the manhole cover is put in place and thoroughly secured, and the barrel is started to revolve. The reason for charging in this order is to prevent the sulphuric acid and chloride of lime from coming in contact before the barrel has been securely closed. When the charging is completed the barrel is started and is kept revolving until the whole of the gold is dissolved. A very ingenious arrangement has been devised which enables the operator, by means of a clay pop-valve, to test from time to time, without

opening the barrel, the presence of an excess of chlorine gas. With the sulphides operated on, each one-ton charge consumed 20 pounds of chloride of lime, and 25 pounds of acid. The time occupied in chlorinating so far has been six hours, but as experience is gained it is expected that this time will be reduced by nearly one-half. When this operation is completed, enough water is introduced to nearly fill the barrel, which is again revolved so as to thoroughly wash the ore and dissolve the chloride of gold. The barrel is then opened and the liquor is decanted off upon large shallow filter-beds. Another wash-over is then put into the barrel, which is again revolved for a few minutes, and then decanted upon the filter. Ultimately the whole charge is turned down in the ordinary way, and a final wash over is given on the filter. The results so far obtained have been remarkably successful. The result of the last eight charges run is appended. Each charge contained a little over one ton of ore of such fineness that 99 per cent. of it would go through a 100-mesh and 60 per cent. through a 150-mesh screen. The assays made of the roasted ore showed 36.70 gold per ton.

Assay of tailings from first charge gave.....	\$1.56
“ “ “ second “	1.03
“ “ “ third “	0.78
“ “ “ fourth “	0.52
“ “ “ fifth “	trace
“ “ “ sixth “	0.78
“ “ “ seventh “	trace
“ “ “ eighth “	0.78

In order to further test the advantages of this system, one charge considerably heavier than the others was tried and it was endeavored to filter it direct in the usual way. While nearly double the amount of wash-water was used for this charge, and while the time occupied in filtering was much more than the other charges required, the tailings resulting contained \$5.68 per ton. There seems to be no difficulty in filtering through a bed of ore from 3 to 4½ inches thick, but when the thickness of the bed is greater, then the filtering of such very fine material becomes almost impossible; hence the advantage of decanting. The precipitation is done in the usual manner with proto-sulphate of iron. The cost of roasting, labour, chemicals, and power will never exceed \$4 per ton. So far it has not attained that figure, some of the work having been done as low as \$3.15 per ton. The actual gold recovered is in all cases within a few cents per ton of the full assay value of the ore, less the amount shown by assay to have remained in the tailings. While the gold obtained in the stamp-mill and amalgamating works is seldom purer than 897 fine, the gold obtained by this process is generally over 978 fine.

That Bad Man.

Some of the Influences that Make Sinners of us Instead of Saints!

Moral characteristics are too often the outgrowth of physical causes. If so, should a man with a diseased body be trusted with armies, banks, railroads or other great enterprises?

In order to strengthen the mind, we must strengthen the body. But in aiding physical forces, certain muscles are frequently strengthened, because of their use, at the sacrifice of the parts of the body unemployed.

The oarsman develops the muscles that are brought into use in rowing, and by continually developing them he is prepared for the great

event. The poet and the artist study nature to improve the mind and the eye.

To enable one to employ all his forces to the best advantage, the body must be in a healthy condition, so that all parts may fully perform their functions and thus elevate the mind by strengthening the body.

The irritable man, the unjust man, the unsuccessful man, the woman in her duties of life, the counting room defaulters, and the thousands continually making failures, receive too little charity, even when the result is prostration by disease, or sudden death by suicide, or some terrible crime. For not until life is ended, and the result of the post-mortem examination is known, can the physician declare that the cause was organic derangement of the system. They pronounce it blood-poisoning, melancholy, loss of vigor, or nervous prostration. These so-called diseases, nine times out of ten, arise from the kidneys, which are diseased so that they cannot expel the waste matter from the blood.

There are hundreds of thousands of people who do not know that the same quantity of blood that passes through the heart (this much favored and admired organ), passes also through the kidneys. If the latter organs are healthy, injurious matter is not retained, but the pure blood that has become filtered by the little hair like tubes which fill the kidneys, goes to the heart to be diffused through the entire body, producing health, and again taking up deadly waste matter, as it goes.

But if the kidneys are diseased, the uric acid attacks the weakest organ in the body, which must eventually give away. It is then that the physician and the patient treat what are really the effects, not the causes. The strong point that the proprietors of Warner's safe cure make is that their great remedy cures so many general diseases because it corrects the causes, leaving the effects to right themselves.

Now, nearly everyone who becomes prostrated, is, if fortunate enough, able to secure the attentions of a physician, who seeks to make an analysis of the fluids passed. We have no doubt that the founders of this great Warner's safe cure, have awakened the medical men from their lethargy on the importance of urinalysis.

We are to-day in receipt of a little book, Warner's safe cure pamphlet, in which we find very valuable information in regard to diseases, the causes of their existence and their cures. It is very ingeniously put before the reader in conversational style, the reader asking questions, and the publishers in their answers making very plain some points but seldom understood. This matter will be received with much more interest than the mass of stuff which is floating about the country, proclaiming the various merits of pretended nostrums.

Personal Charms.

How the Delsartian Theory of Development Beautifies Women.

What is the Delsartian method?

If ladies can secure cultivation of the voice, so as to read and converse in sweetly modulated yet strong and deep tones, and by the same course of training acquire grace of carriage and the development of chest and lungs that ensures health and adds to personal charms, the methods employed are worthy investigation.

So thought our reporter, who called upon Mme Gray, the noted teacher of Oratory and Physical Culture at one of our leading hotels.

As he entered the room a lady tall but well proportioned came with graceful movement toward him. A well shaped head, crowned with a wealth of iron gray hair, dark, brilliant eyes, beneath finely arched brows, were noted as she approached. When she spoke it was with a voice sweet and low, yet with a wonderful compass.

"What is the secret of this power of vocal expression you seem to have?"

"Secret? there is no secret," laughed Mme. Gray. "Time was when I had one of the weakest and thinnest of voices. Any one can accomplish what I have done. It is so easy to acquire a full, resonant voice, that will never tire or grow hoarse. All vocal disabilities may be overcome, hesitation, stammering, stuttering, soon disappear under proper training."

"Does this training affect the physical system?"

"Yes, it will develop the bust to almost ideal perfection. Gentlemen will add four or five inches chest measurement in as many months."

"It is desirable from a point of beauty, then?"

"Yes, ladies gain the roundness of waist, taper of arm and hand, and the perfect poise, ease and grace in movement, that add so much to personal charms."

"Health, I should think, would be benefited, also?"

"Indeed it is. Lung and throat troubles decrease, narrow chests and thin arms are developed, and female weakness largely overcome."

"It seems to be a regular panacea?"

"No, I am sorry to say that some organs cannot be made good in this way after they have been injured as mine were by a sojourn near a southern swamp. Before I tried physical culture and Warner's safe cure I was a confirmed invalid. I was a consumptive in early life, and it is only a few years since I overcame a serious liver trouble. I owe much to Warner's safe cure, and I do not hesitate to acknowledge it."

"And the consumption tendency?"

"Disappeared after the use of this remedy, and when I had learned how to breathe. Not one in twenty breathe in such a way as to fill the air-cells, to expand the strong muscles at the base of the lungs, which should do the labor of expelling the air. Hence, if kidney disease prevails, the lungs affected by the kidney poisoned blood soon give way."

"Is not your system the Delsartian theory?"

"Yes, and I greatly rejoice when this grand teacher gave to the world his ideas. They correspond to those I had long taught, for I am a pioneer in this work and have devoted life and energy to teaching the world that women may gain vocal accomplishments, health, grace and beauty all at the same time by these methods of cultivation."

"You are yet teaching?"

"Yes, at the School of Oratory and Physical culture at Syracuse, N. Y., a permanent institution, now in very successful progress."

*Preliminary Report to the Department of Interior, 1886.

†Engineering and Mining Journal, Vol. XLIV, No. 19.

‡Transactions American Institute of Mining Engineers.

**VALUABLE
PLUMBAGO
AND OTHER
Mineral Lands
FOR SALE,
IN THE TOWNSHIP OF BUCK-
INGHAM, COUNTY OF
OTTAWA.**

1st.—Lot 28, in the 6th range, containing 100 acres, in addition to the salina of the lake.

2nd.—North half of lot 23, in the 5th range, containing 100 acres.

3rd.—Nine acres of lot No. 28, in the 5th range, with water privileges thereto appertaining, being site of mill dam, etc., etc.

The property formerly belonged to the Montreal Plumbago Mining Company, and was worked successfully for several years, until the company's mill was destroyed by fire, but the mill dam remains almost uninjured, and there are on the property several houses, sheds, etc., built for various purposes when mining operations were carried out.

The Plumbago Deposits

upon the property are regarded as amongst the richest and most extensive in the Dominion. As to the quality of the Plumbago, it has been extensively used in the manufacture of crucibles, lubricating leads, stove polish, etc., etc., and given unbounded satisfaction. This is established by the experience of consumers, and by a certificate from the celebrated Battersea Crucible Works, London, England, a copy of which is open for inspection.

MICA

has also been discovered in quantities.

The lands are in the Phosphate region, and recent prospecting has disclosed a rich and extensive deposit of this mineral. There are unrivalled facilities for transporting the ore to and from the mines by the Ottawa River and C. P. Railway. Distance from mines to Railway Station 6 miles. Good road.

All that is required to make these valuable mines handsomely remunerative is a little capital and enterprise.

The Title is Indisputable.

For information apply to

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H. E. DICKSON,
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OR TO THE OFFICE OF

THE CANADIAN MINING REVIEW,
OTTAWA.

**FOR SALE.
VALUABLE
Copper Mining Properties
— IN THE —
Eastern Townships**

TOWNSHIP OF ASCOT.

- 1st. Clark Mine, Lot 11, R. 7 Ascot 187 acres
2nd. Sherbrooke Mine, part Lots 12 and 13,
R. 7 Township of Ascot..... 329 "
3rd. Belvidere Mine, part Lots 9 and 10, R.
9 and 10, R. 8 Ascot 292 "
4th. Mining Rights in same vicinity on..... 250 "

All of the above properties lie within 1½ miles of the Village of Lennoxville, at the junction of the Grand Trunk, Canadian Pacific and Passumpsic Railways, and have been developed to a considerable extent, and veins opened 6 to 20 feet in width, yielding 3 to 5 per cent. of copper, also silver, and 35 to 40 per cent. of sulphur. These mines are only 2½ to 3 miles distant from the City of Sherbrooke, and evidently are of the same class of ores found at Copelton, only four miles distant, owned and worked by the Orford Copper and Sulphur Company, and by Messrs. G. H. Nichols & Co., of New York, which have proved so remunerative.

TOWNSHIP OF ORFORD.

- 5th. Carbuncle Hill Mine, Lots 2 and 3 R. 14, and
2, 3, 4 R. 15, 718 acres. Same class of ore as is found in the Ascot properties above described, but yielding a higher percentage of copper.

TOWNSHIP OF CLEVELAND.

- 6th. St. Francis Mine, ¼ Lot 25 R. 12, 50 acres, with dwelling houses, smith's shop, ore sheds and office, large winding and pumping steam engine, with boiler, winding and pumping gear, and about forty fathoms Cornish lifting pumps complete, railway tracks, ladders, etc., situated three miles from Grand Trunk Railway. A considerable amount of mining work has been done at this mine. A well defined vein richly charged with vitreous purple and yellow sulphurets of copper traverse the entire length of the property, five feet in thickness, yielding 8 to 40 per cent. metallic copper.

TOWNSHIP OF GARTHBY.

- 7th. Fifty-six lots of land, 2,938 acres. This property for the most part is unexplored, but copper is found on the greater part of the property. On one of the lots a vein about twenty feet in width has been found. Samples of the ore have yielded as much as 22 per cent. of copper, being also rich in sulphur. Other samples of pyrites from the same property, free from copper, have yielded as high as 48 per cent. of sulphur. The only drawback to this property is in its distance from the railway, it being about four miles from Garthby Station, Quebec Central Railway. A new line is chartered, however, which, when built, will run directly through the property.

TOWNSHIP OF ACTON.

- 8th. The Acton Mine, 100 acres, with engine, boiler, pumps and appliances. Within three years after this mine was first opened it produced nearly \$500,000 worth of copper. It is situated about half a mile distant from the stations of the Grand Trunk and South Eastern Railways.

- 9th. Brome Mine, part Lots 2 and 3 R. 4, 50 acres.
10th. Bolton Mine, two miles from Eastman Station, Waterloo & Magog Railway, 400 acres.

The above properties formerly belonged to the Canadian Copper and Sulphur Company, and were acquired by the present owner at sheriff's sale, giving an indisputable title thereto.

The whole or any portion of the property will be sold at reasonable prices.

For further information apply to

WM. FARWELL,
SHERBROOKE, P.Q.,
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2560 Acres of Splendid Prairie Farm Lands, Class 1.**

The Manitoba and Northwestern Railway runs through the district in which these lands are situated.

Section	3	14	23	640 Acres.
"	15	14	23	640 "
"	17	14	23	640 "
"	19	14	23	640 "

Title direct from the Crown. Well settled districts surround these lands and good roads to them.

Terms of payment reasonable.

APPLY THIS OFFICE.



Mineral Regulations

TO GOVERN THE DISPOSAL OF

Mineral Lands other than Coal Lands,

1886.

THESE REGULATIONS shall be applicable to all Dominion Lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, iron or other mineral deposits of economic value, with the exception of coal.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein, either by surface or subterranean prospecting for mineral deposits, with a view to obtaining under the Regulations a mining location for the same, but no mining location or mining claim shall be granted until the discovery of the vein, lode or deposit of mineral or metal within the limits of the location or claim.

QUARTZ MINING.

A location for mining, except for iron on veins, lodes or ledges of quartz or other rock in place, shall not exceed forty acres in area. Its length shall not be more than three times its breadth, and its surface boundary shall be four straight lines, the opposite sides of which shall be parallel, except where prior locations would prevent, in which case it may be of such a shape as may be approved of by the Superintendent of Mining.

Any person having discovered a mineral deposit may obtain a mining location therefor, in the manner set forth in the Regulations which provides for the character of the survey and the marks necessary to designate the location on the ground.

When the location has been marked conformably to the requirements of the Regulations, the claimant shall within sixty days thereafter, file with the local agent in the Dominion Land Office for the district in which the location is situated, a declaration or oath setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as aforesaid; and shall, along with such declaration, pay to the said agent an entry fee of FIVE DOLLARS. The agent's receipt for such fee will be the claimant's authority to enter into possession of the location applied for.

At any time before the expiration of FIVE years from the date of his obtaining the agent's receipt it shall be open to the claimant to purchase the location on filing with the local agent proof that he has expended not less than FIVE HUNDRED DOLLARS in actual mining operations on the same; but the claimant is required, before the expiration of each of the five years, to prove that he has performed not less than ONE HUNDRED DOLLARS' worth of labor during the year in the actual development of his claim, and at the same time obtain a renewal of his location receipt, for which he is required to pay a fee of FIVE DOLLARS.

The price to be paid for a mining location shall be at the rate of FIVE DOLLARS PER ACRE, cash, and the sum of FIFTY DOLLARS extra for the survey of the same.

No more than one mining location shall be granted to any individual claimant upon the same lode or vein.

IRON.

The Minister of the Interior may grant a location for the mining of iron, not exceeding 160 acres in area which shall be bounded by north and south and east and west lines astronomically, and its breadth shall equal its length. Provided that should any person making an application purporting to be for the purpose of

mining iron thus obtain, whether in good faith or fraudulently, possession of a valuable mineral deposit other than iron, his right in such deposit shall be restricted to the area prescribed by the Regulations for other minerals, and the rest of the location shall revert to the Crown for such disposition as the Minister may direct.

The regulations also provide for the manner in which land may be acquired for milling purposes, reduction works or other works incidental to mining operations.

Locations taken up prior to this date may, until the 1st of August, 1886, be re-marked and re-entered in conformity with the Regulations without payment of new fees, in cases where no existing interests would thereby be prejudicially affected.

PLACER MINING.

The Regulations laid down in respect to quartz mining shall be applicable to placer mining as far as they relate to entries, entry fees, assignments, marking of localities, agents' receipts, and generally where they can be applied.

The nature and size of placer mining claims are provided for in the Regulations, including bar, dry, bench, creek or hill diggings, and the RIGHTS AND DUTIES OF MINERS are fully set forth.

The Regulations apply also to

BED-ROCK FLUMES, DRAINAGE OF MINES AND DITCHES.

The GENERAL PROVISIONS of the Regulations include the interpretation of expressions used therein; how disputes shall be heard and adjudicated upon; under what circumstances miners shall be entitled to absent themselves from their locations or diggings, etc., etc.

THE SCHEDULE OF MINING REGULATIONS

Contains the forms to be observed in the drawing up of all documents such as:— "Application and affidavit of discoverer of quartz mine." "Receipt for fee paid by applicant for mining location." "Receipt for fee on extension of time for purchase of a mining location." "Patent of a mining location." "Certificate of the assignment of a mining location." "Application for grant for placer mining and affidavit of applicant." "Grant for placer mining." "Certificate of the assignment of a placer mining claim." "Grant to a bed rock flume company." "Grant for drainage." "Grant of right to divert water and construct ditches."

Since the publication, in 1884, of the Mining Regulations to govern the disposal of Dominion Mineral Lands the same have been carefully and thoroughly revised with a view to ensure ample protection to the public interests, and at the same time to encourage the prospector and miner in order that the mineral resources may be made valuable by development.

COPIES OF THE REGULATIONS MAY BE OBTAINED UPON APPLICATION TO THE DEPARTMENT OF THE INTERIOR.

A. M. BURGESS,

Deputy Minister of the Interior.

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Oxford & New Glasgow Railway SECTIONS.

1st.—Birch Hill Road to Pugwash Junction.....	13 miles.
2nd.—Pugwash Junction to Pugwash... Station.....	5 miles.
3rd.—Pugwash Junction to Wallace Station.....	7 miles.
4th.—Wallace Station to Mingo Road..	17 miles.

Tenders for Grading Bridge and Culvert Masonry, Fencing, &c.

SEALED TENDERS, addressed to the undersigned and endorsed, "Tender for Oxford and New Glasgow Railway," will be received at this

office up to noon on Friday, the 18th day of November, 1887, for the grading, bridge and culvert masonry, fencing, &c.

Plans and profiles will be open for inspection at the office of the Chief Engineer of Government Railways at Ottawa, and also at the office of the Oxford and New Glasgow Railway at Wallace, Cumberland Co., Nova Scotia, on and after the 10th day of November, 1887, where the general specification and form of tender may be obtained upon application.

No tender will be entertained unless on one of the printed forms, and all conditions are complied with.

This Department does not bind itself to except the lowest or any tender.

A. P. BRADLEY,

Secretary.

Department of Railways and Canals,
Ottawa, 20th October, 1887.

FOR SALE
GROUND MICA.
Ten Tons Finely Ground
**PURE WHITE
MUSCOVITE MICA.**

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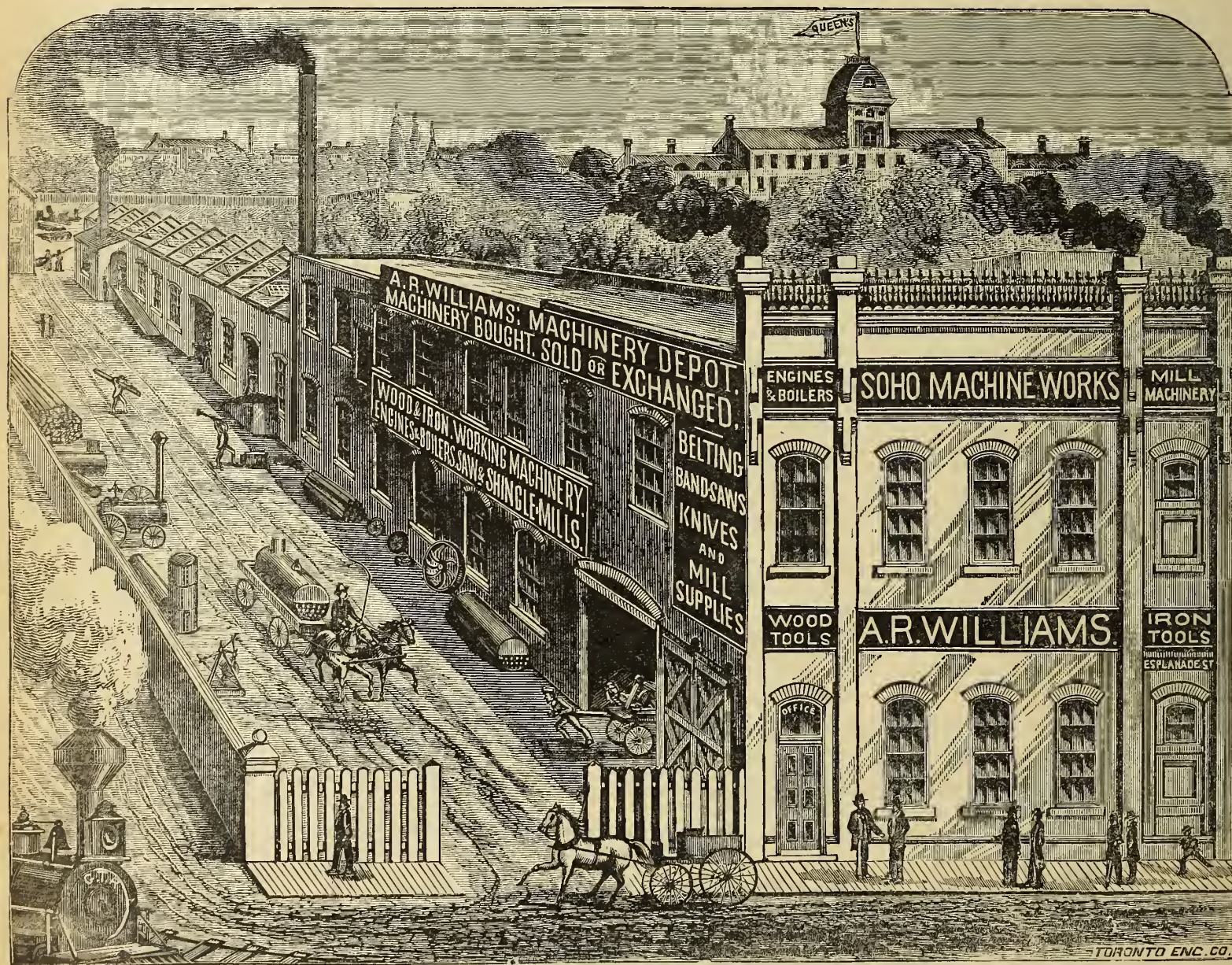
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Canadian Mining Review



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1887.—OTTAWA, DECEMBER—1887.

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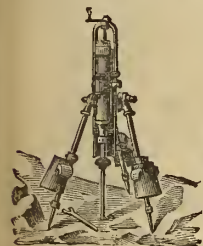
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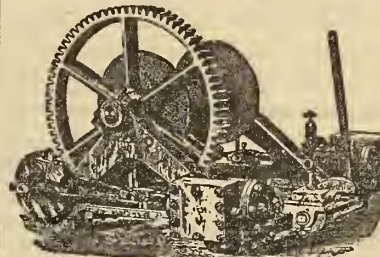
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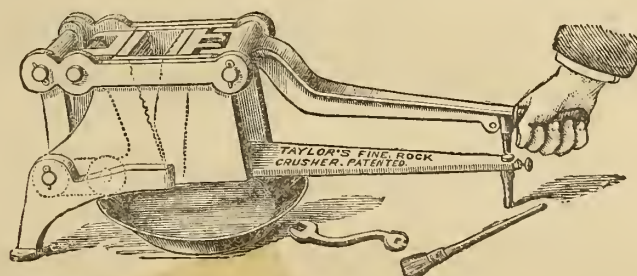
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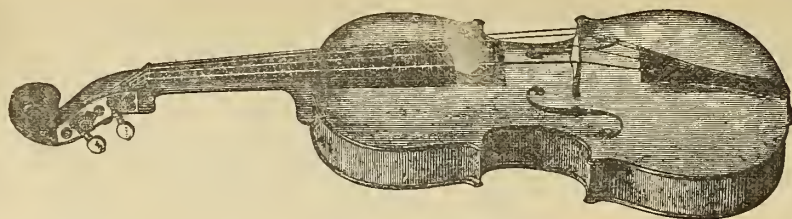
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Full particulars can be obtained the Com-
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VIOLINS FROM \$3 TO \$12,
AT HALF PRICE. AND

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AT ONE THIRD OFF, ALSO

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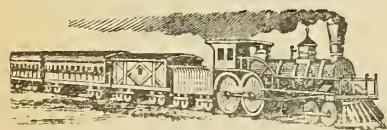


NOTICE RESPECTING PASSPORTS.

PERSONS requiring passports from the Canadian Government should make application to this Department for the same, such application to be accompanied by the sum of four dollars, in payment of the official fee upon passports as fixed by the Governor-in-Council.

G. POWELL,
Under Secretary of State.

OTTAWA, 19th Feb., 1886.



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D. POTTINGER,
Chief Superintendent.
Passenger Office, Moncton, N.B.
Nov. 22nd, 1886.



Department of Inland Revenue.—An Act respecting Agricultural Fertilizers.

The public is hereby notified that the provisions of the Act respecting AGRICULTURAL FERTILIZERS came into force on the 1st of January 1886 and that all Fertilizers sold thereafter require to be sold subject to the conditions and restrictions therein contained—the main features of which are as follows:

The expression "fertilizer" means and includes all fertilizers which are sold at more than TEN DOLLARS per ton, and which contains ammonia, or its equivalent of nitrogen, or phosphoric acid.

Every manufacturer or importer of fertilizers for sale, shall, in the course of the month of January in each year, and before offering the same fertilizer for sale, transmit to the Minister of Inland Revenue, carriage paid, a sealed glass jar, containing at least two pounds of the fertilizer manufactured or imported by him, with the certificate of analysis of the same, together with an affidavit setting forth that each jar contains a fair average sample of the fertilizer manufactured or imported by him; and such sample shall be preserved by the Minister of Inland Revenue for the purpose of comparison with any sample of fertilizer which is obtained in the course of the twelve months then next ensuing from such manufacturer or importer, and which is transmitted to the chief analyst for analysis.

If the fertilizer is put up in packages, every such package intended for sale or distribution within Canada shall have the manufacturer's certificate of analysis placed upon or securely attached to each package by the manufacturer; if the fertilizer is in bags it shall be distinctly stamped or printed upon each bag; if it is in barrels, it shall be either branded, stamped or printed upon the head of each barrel or distinctly printed upon good paper and securely pasted upon the head of each barrel, or upon a tag securely attached to the head of each barrel; if it is in bulk, the manufacturer's certificate shall be produced and a copy given to each purchaser.

No fertilizer shall be sold or offered or exposed for sale unless a certificate of

analysis and sample of the same shall have been transmitted to the Minister of Inland Revenue and the provisions of the foregoing sub-section have been complied with.

Every person who sells or offers or exposes for sale any fertilizer, in respect of which the provisions of this Act have not been complied with—or who permits a certificate of analysis to be attached to any package, bag or barrel of such fertilizer, or to be produced to the inspector, to accompany the bill of inspection of such inspector stating that the fertilizer contains a larger percentage of the constituents mentioned in sub-section No. 11 of the Act than is contained therein—or who sells, offers or exposes for sale any fertilizer purporting to have been inspected, and which does not contain the percentage of constituents mentioned in the next preceding section—or who sells or offers or exposes for sale any fertilizer which does not contain the percentage of constituents mentioned in the manufacturer's certificate accompanying the same, shall be liable in each case to a penalty not exceeding fifty dollars for the first offence, and for each subsequent offence to a penalty not exceeding one hundred dollars. Provided always that deficiency of one per centum of the ammonia, or its equivalent of nitrogen or of the phosphoric acid, claimed to be contained shall not be considered as evidence of fraudulent intent.

The Act passed in the forty-seventh year of Her Majesty's reign, chaptered thirty-seven and entitled, "An Act to prevent fraud in the manufacture and sale of agricultural fertilizers," is by this Act repealed, except in regard to any offence committed against it or any prosecution or other act commenced and not concluded or completed, and any payment of money due in respect of any provision thereof.

A copy of the Act may be obtained upon application to the Department of Inland Revenue.

E. MIALLE,
Commissioner.

15th Dec., 1887.

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The Canadian Mining Review

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CONDUCTED BY E. T. A. BELL.

The CANADIAN MINING REVIEW, is devoted to the opening up of the mineral wealth of the Dominion, and its publishers will be thankful for any encouragement they may receive at the hands of those who are interested in its speedy development.

Visitors from the mining districts, as well as others interested in Canadian Mineral Lands, are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the office not later than the 15th of the month.

Address all correspondence, &c., to the Manager of the CANADIAN MINING REVIEW, Ottawa.

Gold and Silver Ores of Ontario and Quebec.

The oft recurring discovery of gold ores holding free gold in some new locality brings before our notice the present condition of this branch of the mining industry. Treatment by amalgamation of sulphuret ores either in the raw state or after roasting has resulted in a loss by this process of too large a percentage of the gold the ore contains, as there are few or no true free milling ores in the districts like the quartz and free gold ores of Nova Scotia. In 1880, Mr. Richard P. Rothwell, editor of the *Mining and Engineering Journal* of New York, bonded the Gatling Mining Company's mill and mines in the Township of Marmora, along with other properties for a New York syndicate, and expended some \$15,000 in testing the value of the mines, and the possibility of treating the ores profitably. Amalgamation was tried and condemned, and the chlorination process (*which is a wet one*) recommended. The Canada Consolidated Gold Mining Company was formed and worked the mines and erected extensive works for milling and treating the ore by chlorination, but in the fall of 1883 the company closed the works, which are now under a first mortgage of \$100,000, and a second one of \$300,000. Interests in the company are held by parties in Canada, United States and France, and these interests do not seem to be united on any course of action or re-organization, with a view to further working. After the operations of the company ceased in 1883, the mines and plant were leased by one of the chief stock-

holders from New York and two gentlemen from Detroit. The lessees operated it until the fall of 1884, and produced some \$30,000 in gold by chlorination, but much trouble was experienced in working the process in summer, and still worse in our cold winter climate, proving for a second time in Canada that *a wet process will not pay in winter*, as was formerly proved in copper ores in the Province of Quebec, at a cost of \$500,000. This ought to be sufficient evidence against a wet process in this climate. The ore is Arsenical Iron Pyrites (Mispickel) holding Arsenious Oxide As_2O_3 . 55.40 per cent. = Arsenic 42.00 per cent., and averages \$14 per ton in gold. The Ore having been crushed and dressed, the Arsenious Oxide is driven off by roasting in revolving furnaces and lodges in chambers conducted at much expense for the purpose of saving it. Since the date the lessees stopped mining until the present time the Arsenious Acid has been resublimed in a small furnace and an exceedingly pure quality produced, yielding as high as 99.86 per cent. of Arsenious Oxide, which has been mostly shipped to the United States, where it sells at \$60 per ton and is the purest in quality which has been brought to that market. It is worthy of note also that the gold produced from these ores was the purest or that most free from alloy which has been sent to the mint of the United States. There are many other deposits of this ore in the district not held by this company. In this and other sections the gold and silver ores already found are of great variety, and are with few exceptions such as give better results when smelted than by either amalgamation or chlorination processes being sulphuret ores of Iron, Copper or Lead, with varying richness in the following: Gold, Silver, Copper, Lead, Antimony, Arsenic, Sulphur, all of which can be best utilized by roasting and then smelting along with lead. The volatile matter, Antimony, Arsenic, Sulphur, being first driven off in proper furnaces for that purpose, and the residue smelted in presence of Lead, the Iron present passing into the slag is tapped off, leaving the heavy metals Gold, Silver, Copper and Lead in the the furnaces until a value of from \$1,000 to \$2,000 to the ton of Gold and Silver is reached. A mixture of ores is required for smelting as the slate, lime and quartz, forming the gangue can be proportioned so as to produce along with the Iron a good running slag. The advantages of smelting in presence of Lead are, a larger percentage of the precious metals is obtained than by amalgamation or chlorination, the great variety of ores that can be worked, also low grade Galena holding under \$10 per ton of silver can be made use of by this process. As we have an abundant supply of such Lead ore as well as some rich in silver in this district, a means of working the low grade at profit is obtained, which would prevent the impor-

tation of Lead and its manufactures into the country as is now done. The central position of Ottawa, with rail and water transportation and our vast water power made available for milling of ores, and the electro-metallurgical treatment of metals renders the Capital pre-eminent for the location of such an industry.

The Phosphate Season of 1887.

The shipment of phosphate by the SS. *Scotland*, on the 24th of November, for England, via a southern cotton port, closed the season of 1887 and made a total export from Montreal of 20,349 tons, against 19,298 in 1886, a gain of 1,051 tons, though less than in some previous years. The low water in the Lievres River prevented the forwarding of a considerable quantity from the mines in Portland, and some further output was held over in hopes of a better market next year for the lower grades. In addition to the amount exported to Europe should be reckoned about 200 tons used in Canada and about 300 tons sent to the United States; so that the total deliveries of the year will approximate 21,000 tons.

In reviewing the business features of the season, we may remark that

FREIGHTS have been fairly moderate in figure and sufficient in supply. Rates have ranged from 2s. 6d. for vessels going round-about voyages, to 15s. for direct steamers for Hamburg. The railway rates may be stated as 6s. 3d. to Liverpool and Glasgow, 7s. 6d. to London, 10s. to Irish ports, and 12s. 6d. to 15s. to Hamburg.

Higher prices are obtained in Ireland and Germany than in England, but hardly an equivalent for the extra freight. The steadily increasing change of the deal-shipping trade from Quebec to Montreal and from sailing vessels to steamers, largely augments the supply of tonnage that requires phosphate for ballast, and the low rates of freight that sometimes during the season obtain for grain make even the regular line steamers anxious to get phosphate for dead-weight cargo at ballast rates. When grain rates drop below 1s. 6d. per quarter the ship agents give the preference to phosphate at 7s. per ton. The large Quebec wood shippers have nearly all opened offices in Montreal, and it is expected that Montreal will continue to absorb the export trade from the Ottawa district. The prospects for favorable freighting facilities for phosphate are, therefore, very hopeful. It is also pleasing to remark that the unwise and foolish competition and antagonism heretofore existing among the Montreal phosphate shipping agents has been replaced by a spirit of co operation and amity, and unnecessary expense has thus been avoided.

PRICES opened rather weak, owing to trade depression in Europe and a large visible supply of low grade phosphates, but the price for 80 per cent. phosphate strengthened and was firm at the close. The lowest sales for 80 per cent. were made at 11¼ for Ireland, which was equal

to less than $10\frac{1}{2}$ in England, but the bulk of the deliveries in England were made on contracts at 1s. per unit. For Hamburg $12\frac{1}{2}$ d. to 13d. was obtained, and as high as $13\frac{1}{2}$ d. for a German outport. All these prices carried $\frac{1}{2}$ d. rise per unit over 80 per cent.. For lower grades the prices were relatively lower, 9 $\frac{1}{2}$ d. for 75 per cent. and 8d. for 70 having been accepted, these grades being slow of sale owing to the competition of French phosphates of nearly equal quality that were of so soft a nature that they required no grinding.

THE FUTURE OUTLOOK for Canadian phosphate is favorable. $12\frac{1}{2}$ d. could be had now for 80 per cent. for next season, and there are some signs of a strengthening in the price for low grades. A sale of 600 tons ground phosphate has been concluded in Chicago at a price equal to about 17 cents per unit or \$10 per ton for 60 per cent. This affords an opening for the output of the mines which has not been utilized before and the increase of which will have a very beneficial effect upon the future of the industry. A good market for all the high grade phosphate that Canada can produce now seems assured. The extension of the field for low grade and pulverized phosphate and the introduction of suitable grinding machinery, with processes for separating impurities by a more effective and less expensive method than the present system of hand cobbing are the great desiderata, and it is cheering to know that on all these points there is great reason for encouragement. Several of our active and enterprising phosphate managers and agents are investigating and pushing diligently in all these directions with a combination of zeal and knowledge which is sure to be rewarded. Great interest is being excited in the use of the crude phosphate upon the soil and in the development of a home market which will largely increase the demand. The amicable spirit which, it has been remarked, exists between the Montreal shippers, is extending among the foreign selling agents. Heretofore the price of Canadian phosphate has often been unduly depressed by rivalry in effecting sales and by indiscriminate offerings of the same lots through various brokers, giving the impression that the supply was greatly in excess of the requirements. The business is now becoming concentrated and a better understanding exists as to its conduct. Altogether it may be said that the phosphate business of Canada is in a sound and healthful condition and a continuous and prosperous future seems to be assured to it.

Canadian Fertilizer Industry.

The only attempts so far made to utilize Canadian phosphate at home have been at the fertilizer factories in Brockville and Smith's Falls, Ontario. The factory at Smith's Falls was established originally for the manufacture of chemicals of various kinds, but a few years ago the production of fertilizers was tried as an experiment, and as a very good article was

made, with no adulterations, it got a good name and the demand has been steadily increasing. Mr. Brodie, B.Sc., a graduate of McGill College, has charge of the works which are controlled by Messrs. Brodie & Harvey, the well-known flour and milling firm in Montreal. Mr. Brodie states that he makes the sulphuric acid from pure sulphur. He gets rid of the hydrofluoric acid gas, which is produced by the action of the sulphuric acid on the apatite, by a simple arrangement of wooden chimneys, thus solving a difficulty which has embarrassed many persons in their first efforts to use Canadian phosphate. He makes a "complete fertilizer," that is, a mixture of the three principal ingredients of plant food, namely: phosphate, potash and ammonia. The demand is growing in a very encouraging manner, for when a farmer tries it once he generally comes back for more. Mr. Brodie says he could sell 1,000 tons the coming year if he could make it, but the factory is small and the facilities not very great.

There is evidently a large and extending field in this direction both for profit and usefulness. The soil of the older settled provinces of Canada has become impoverished by many years of cropping without replenishment, and districts that once yielded great stores of grain now only afford the scantiest pasturage. If one was animated only by patriotic and philanthropic zeal he could render no greater benefit to his country than to enter on a missionary crusade to enlighten the farmers as to the value of mineral manures; or if he likes to make his benevolence profitable to himself let him supply the article with which the farmer may prove the truth of his teachings. The establishment of fertilizer factories in Canada and the education of the farmer in the use of manures is a cause that invites the best attention both of the capitalist and of the Government.

Soluble and Insoluble Phosphate.

It is estimated that 400,000 tons of sulphuric acid 50° strength are used annually in the United States to convert insoluble phosphoric acid into soluble phosphoric acid, and that this quantity will be doubled during the next five years. Four hundred thousand tons of sulphuric acid at \$10 per ton is \$4,000,000, for cost of the acid (1,750 pounds being required for each ton of the South Carolina phosphate rock, the value of the acid is the larger of the two) to say nothing of the other expenses attending its use, the item of transportation alone being nearly doubled, adding largely to its cost to the farmer.

If soluble phosphoric acid immediately reverts to its original condition when applied to the soil, and it is so stated in bulletin No. 12 of the Maine Experimental Station, it seems to be a useless expense to use sulphuric acid when fine ground phosphates are equally available to plants at one quarter of the price.

It is estimated that there are 1,000,000 tons of fertilizers made annually of the value of \$30,000,000, thus adding by using sulphuric acid over one-half to their cost. This is not a small burden for the consumer to pay for lack of knowledge.

Ancient Mines and their Value.

H. B. Small, Ottawa.

It is a somewhat curious fact that in the search for mineral wealth and new mining localities, all recollection of the mines worked by the ancients should have comparatively passed away, and that in many instances the very sites of those mines have been forgotten. From the earliest pages of the Bible, where we read, "the gold of that land is good," reference is made to mineral resources, but the location is almost if not quite lost. Not long ago the writer read a work that casually fell into his hands, entitled "The Land of Midian," which described very fully researches made by Captain Burton in an almost unknown country, viz., the east coast of the Gulf of Akabah, one of the two narrow inlets in which the Red Sea terminates. Captain Moresby and Dr. Becke had been there before Burton, but until the visit of the latter it was practically unvisited and its shores unexplored. From its barren and rocky surroundings the population is scant, but there is abundant evidence of a former populous time. Ruins of large towns, not built of mud as the modern Arabian dwellings are, but of solid masonry, roads cut in the rock, aqueducts several miles long, and remains of artificial reservoirs, all point to former wealth. And this was due to the presence of minerals. Gold is there, silver, tin, antimony, and the auriferous quartz, just as in the Australia and California of to-day. Ancient mining works lie destroyed round every town ruin; heaps of scoriae still remain close to the mineral furnaces; there are mines for turquoise, and from the brief accounts of the country, the mineral wealth there is ten-fold that of the neighbouring peninsular, where in a few deserted mines turquoise are still found. Yet this mining country is to-day unworked, whilst the new world to its northernmost limits is being scoured for fresh finds and fresh workings.

In Servia, in Central Europe, where the history of its mines embraces three periods, the Prehistoric, the Greek and the Roman, the old abandoned workings have quite recently been again occupied, and with every prospect of success. These mines under the Romans were worked for silver, lead and copper. Shafts and open quarries are frequently being discovered with the still standing ores, smelting furnaces, and enormous heaps of slag holding half refined ores and metals. These latter covered with ancient forests, continue well preserved. The smelting as then carried on was done by piling the ore between layers of wood in vast pyramids on the tops of the hills, and firing these in

windy weather. Half melted masses with charcoal and half burnt wood are found from time to time. These ore residues, it is said, would even now pan out well by re-treatment, as the slag still contains paying percentages of lead, rich in silver. An analysis recently made of this slag shows that the ores were first partially oxidised by roasting, and then reduced by smelting with pyrites. Calculations based on the amount of metal procured from the existing slag heaps, estimate the returns to have been 40 per cent. of lead, 60 oz. of silver and 1 to 3 oz. of gold to the ton! Surely some of these ancient mines are worth looking after, and would be a better investment than many of the western "flats" or mining cities.

The Canadian Iron Trade.

By James H. Bartlett, M.E., Montreal.

(Continued from last issue.)

A radius of ten miles from Stellarton would include the entire Pictou coal-field, four large collieries in active operation, producing over half a million tons of coal per annum, a coal particularly suitable in quality for the manufacture of coke and for iron working. Within this radius, too, would be included immense deposits of limestone, and five different varieties of iron-ore, with deposits of fire-clay and moulding-sand. It would take in Pictou harbor, the finest harbor on the south shore of the Gulf of St. Lawrence, with five loading and shipping wharves and piers, and over 75 miles of railway, radiating from Stellarton; and would also include the towns of Pictou, New Glasgow, Westville, Stellarton, and many villages and hamlets, aggregating over fifteen thousand inhabitants, together with a steel-works and forge, foundries, boiler and machine-shops, glass-works, saw-mills, stone-quarries, brick-yards, ship-yards, etc., some of the largest ships ever built in Canada having been launched from here.

The Cape Breton coal-fields are only 180 miles distant by sea. A railway to reach them is now in course of construction; another railway is building to the westward, which will reduce the distance from the Cumberland and Joggings coal-fields to 75 miles, instead of 112 miles as at present.

The Inspector of Mines for the Province of Nova Scotia, says in his last annual report: "It may be remarked that in Pictou County the conditions for making iron and steel cheaply are unsurpassed, as within a few miles are collected numerous iron-ores, fluxes, and good furnace-fuels, and there is railway and water communication with all parts of the Dominion."

In New Brunswick there is hematite iron-ore; in the county of Carleton ore and coal are to be found, and also in different districts of that Province. Bog-ore occurs in Queen's, Sunbury, York, Charlotte, Restigouche, and Northumberland Counties, in close proximity to the Intercolonial Railway.

The iron-ores in Quebec are magnetites, occurring more or less throughout the Laurentian range of mountains along the Ottawa river. At the Hull or Baldwin mines, west of the Gatineau River, the ore analyses 67 per cent. The Haycock mine ore ranges from 64 to 68 per cent. of metal; the Bristol mine 58 per cent. In Three Rivers and Drummondville there is bog iron-ore in abundance, and unlimited timber for making charcoal.

In the eastern district of Ontario, back of Kingston, Belleville, Trenton, and Cobourg, between Lake Ontario and the Ottawa River, in the townships of Marmora, Hastings Tudor, Bedford, Madoc, Wollaston, Palmerston, Bagot, Belmont, Darling, Barrie, Galway, Snowden, and many others, there is magnetic iron in abundance. This district is served by the Ontario and Quebec, Kingston and Pembroke railways, the Central Ontario, Cobourg and Peterboro', and Grand Trunk railways, and by the Rideau and Trent canals. There is plenty of timber all through this district. A surveyor who has explored through these districts, and away up 130 miles further, to the intersection of the Canadian Pacific Railway, assures me that not only was there an unlimited quantity of iron through that district, but that the forests along that line of communication could not be surpassed in any country in the world for the production of charcoal. There are also deposits of iron-ore in many other parts of the Province. In Manitoba there is iron-ore, and they have about 15,000 square miles underlaid with coal.

In the Northwest Provinces, the future great wheat-producing country of the continent, there are deposits of iron-ore reported, but the country is so vast no special explorations have been made for it. They are working large deposits of anthracite coal at Anthracite, N.W.T., of a quality which compares favorably with the best from Pennsylvania, and there are 500 square miles of this section. The climate of this country is cold, but 50,000 square miles of it is underlaid with coal of good quality, easily reached and worked, in seams estimated to yield from five to nine million tons per square mile.

San Francisco is largely supplied with Nanaimo coal, and the blast-furnaces in Oregon get most of their iron-ore from Texada Island in British Columbia. The eastern cities of Portland and Boston are supplied with some of their coal from Nova Scotia, and it would appear possible also to supply iron-ore to eastern furnaces from that Province.

DISPOSITION OF THE GOVERNMENT.

There is at present an opening in Canada for the manufacture of iron. In the Canadian hand-book for the Colonial and Indian Exhibition, prepared under the direction of the Hon. John Carling, Minister of Agriculture, it is stated, "for a country having 11,000 miles of railway, with a weight of over a million tons of rails, and possessing for the manufacture of iron natural advantages which few, if any places in the world surpass, the development of Canada's iron industry is wonderfully slow. There appears to be a good field for skill, enterprise, and capital in connection with our iron industry."

Sir Charles Tupper has recently said in the Canadian Parliament: "Our present annual consumption is equivalent to 250,000 tons of pig-iron, leaving steel rails out of the question altogether. To make this quantity of pig-iron it requires 750,000 tons of iron-ore, 120,000 tons of limestone and 750,000 tons of coal to make it into iron in its first stage, pig-iron; and the freight required for the means of intercommunication in bringing these materials together amounts to not less than 1,625,000 tons. To manufacture it into puddled bars, merchant bars and the various shapes and sizes into which it is made, would require an additional quantity of 750,000 tons of coal, making a total consumption of 1,500,000."

On the ground that the development of the iron industry of Canada will tax the coal

industry of the country to its utmost capacity, in order to furnish the additional output that will be required, and with all the advantages connected with that increased development, Sir Charles Tupper was enabled to say to the House that, although making anthracite coal free will take \$497,000 away from the Government in revenue which it is now receiving, they would be perfectly justified in doing it, because the development of this iron-industry would be given to the coal-mining industry a greater advantage and boon than that which would be taken away by the removal of the duty.

The disposition of the Government is further shown by the liberal bounty already mentioned, which is given, in addition to the protection afforded by the tariff, to producers of iron from Canadian ores. This bounty is payable quarterly in money.

THE CANADIAN COAL TRADE.

The growth and extent of the Canadian coal-trade will be seen from the following figures:

Total Consumption of Coal in the Dominion.

Year.	Net tons of 2,000 lbs.
1868.....	714,893
1869.....	636,704
1870.....	859,630
1871.....	852,217
1872.....	1,227,653
1873.....	1,338,403
1874.....	1,454,636
1875.....	1,362,363
1876.....	1,466,531
1877.....	1,751,031
1878.....	1,665,814
1879.....	1,748,164
1880.....	2,094,844
1881.....	2,260,680
1882.....	2,708,654
1883.....	3,085,689
1884.....	3,556,673
1885.....	3,439,745
1886.....	3,515,769

The total production of coal for the Dominion is shown in this table:

Total Production of Coal in the Dominion.

Year.	Net tons of 2,000 lbs.
1868.....	623,392
1869.....	687,527
1870.....	734,285
1871.....	804,431
1872.....	1,038,349
1873.....	1,228,852
1874.....	1,068,166
1875.....	998,104
1876.....	950,483
1877.....	1,020,875
1878.....	1,109,595
1879.....	1,152,783
1880.....	1,456,795
1881.....	1,514,542
1882.....	1,845,548
1883.....	1,831,819
1884.....	1,997,368
1885.....	1,973,987
1886.....	2,104,170

APPENDIX.

The following is the new Canadian tariff on iron and steel, and articles manufactured from them (the percentages stated are *ad valorem*, and the tons are net tons of 2,000 pounds).

Goods Subject to Duties—Wrought scrap-iron and scrap-steel, being waste or refuse wrought-iron or steel that has been in actual use and is fit only to be manufactured, \$2 per ton; ferro-manganese, ferro-silicon, spiegel, steel bloom-ends, and crop-ends of steel rails, for the manufacture of steel, \$2 per ton; iron in pigs, iron kentledge and cast scrap iron, \$4 per ton; iron in slabs, blooms, loops, puddled bars, or other forms less finished than iron in bars, and more advanced than pig-iron, except castings, \$9 per ton; bar iron, rolled or hammered, comprising flats, rounds

and squares, and bars and shapes of rolled iron, not elsewhere specified, \$13 per ton; iron and steel wire, galvanized or not, No. 15 gauge and coarser, not elsewhere specified, 25 per cent. *ad valorem*; wire of spring-steel, coppered or tinned, No. 9 gauge or smaller, not elsewhere specified, 20 per cent.; boiler or other plate-iron, sheared or unsheared, skelp-iron, sheared or rolled in grooves, and sheet-iron, common or black, not thinner than No. 20 gauge, not elsewhere specified, including nail plate of iron or steel, No. 16 gauge and thicker, \$13 per ton; sheet-iron, common or black, smoothed or polished, and coated or galvanized, thinner than No. 20 gauge, Canada plates, and plates of iron or steel not less than 30 inches wide and not less than $\frac{1}{4}$ in. in thickness, $12\frac{1}{2}$ per cent.; hoop or band or scroll or other iron, 8 in. or less in width, and not thinner than No. 20 gauge, \$13 per ton; hoop or band or scroll or other iron, 8 in. or less in width and thinner than No. 20 gauge, $12\frac{1}{2}$ per cent.; railway fish-plates, \$12 per ton; rolled iron or steel angles, channels, structural shapes and special sections, weighing less than 25 pounds per linear yard, not elsewhere specified, $\frac{1}{2}$ cent per pound and 10 per cent.; rolled iron or steel beams, girders, joists, angles, channels, structural shapes, and special sections, weighing not less than 25 pounds per linear yard, $12\frac{1}{2}$ per cent.; rolled iron or steel beams, girders, joists, angles, channels, eye-bar blanks made by the Kloman process, together with all other structural shapes of rolled iron or steel, including rolled iron or steel bridge plate not less than $\frac{3}{8}$ in. thick, nor less than 15 in. wide, when imported by manufacturers of bridges for use exclusively in the manufacture of iron and steel bridges, $12\frac{1}{2}$ per cent. *ad valorem*; iron bridges and structural iron-work, $1\frac{1}{2}$ cent per pound, provided that the duty shall not be less than 35 per cent.; forgings of iron and steel, or forged iron of whatever shape or in whatever stage of manufacture, not elsewhere specified, $1\frac{1}{2}$ cent per pound, provided that the duty shall not be less than 35 per cent.; steel ingots, cogged ingots, blooms and slabs, by whatever process made, billets and bars, bands, hoops, strips and sheets of all gauges and widths, all of above classes of steel not elsewhere provided for, valued at 4 cents or less per pound, 30 per cent.; but not less than \$12 per ton, except ingots, cogged ingots, blooms and slabs upon which the specific duty shall be not less than \$8 per ton; when of greater value than 4 cents per pound, $12\frac{1}{2}$ per cent.; plate of iron and steel combined, and steel not specially enumerated or provided for 30 per cent.; (*provided*, that on all iron and steel bars, rods, strips or steel sheets, of whatever shape, and on all iron or steel bars of irregular shape or section, cold-rolled, cold-hammered or polished in any way in addition to the ordinary process of hot rolling or hammering, there shall be paid $\frac{1}{2}$ cent per pound in addition to the rates imposed on the said materials, and *provided further*, that all metal produced from iron or its ores, which is cast and malleable, of whatever description or form, without regard to the percentage of carbon contained therein, whether produced by cementation, or converted, cast or made from iron or its ores by the crucible, Bessemer, pneumatic, Thomas Gilchrist basic, Siemens-Martin or open hearth process, or by the equivalent of either, or by the combination of two or more of the processes or their equivalents, or by any fusion or other process which produces from iron or its ores a metal either granulous or fibrous in structure, which is cast and malleable, except what is known as malleable iron castings, shall be classed and

denominated as steel, and *provided further*, that all articles rated as iron or manufacture of iron, shall be chargeable with the same rate of duty if made of steel, or of steel and iron combined, unless otherwise specially provided for); malleable iron castings, and steel castings not elsewhere specified, \$25 per ton, provided the duty shall not be less than 30 per cent.; cast-iron vessels, plates, stove-plates and iron, sad-irons, hatters' irons, tailors' irons and casting of irons not elsewhere specified, \$16 per ton, provided the duty shall not be less than 30 per cent., cast-iron pipe of every description, \$12 per ton, provided that the duty shall not be less than 35 per cent.; axles and springs of iron or steel, parts thereof, axle-bars, axle-blanks or forgings for carriages other than railway and tramway vehicles, without reference to the stage of manufacture, 1 cent per pound and 30 per cent.; iron or steel car-axles, parts thereof, axle-blanks or forgings for axles, and car-springs of all kinds, and all other springs not elsewhere specified, without reference to the stage of manufacture, \$30 per ton, but not less than 35 per cent.; fire engines, 35 per cent.; locomotives and other steam-engines, boilers and machinery composed wholly or in part of iron or steel, not elsewhere specified, 30 per cent.; (*provided*, that any locomotive which with its tender weighs 30 tons over, shall pay a duty of not less than \$2,000; portable machines, portable steam engines, threshers and separators, horse-powers, portable saw mills and planing mills, and parts thereof in any stage of manufacture, 35 per cent.; boiler tubes of wrought iron or steel, 15 per cent.; tubes not welded, nor more than $1\frac{1}{2}$ in. in diameter, of rolled steel, 15 per cent.; lap-welded iron tubing, threaded and coupled or not, $1\frac{1}{4}$ in. in diameter and over, but not over 2 in., for use exclusively in artesian wells, petroleum pipe-lines and for petroleum refineries, 20 per cent.; wrought iron tubing, threaded and coupled or not, over 2 in. in diameter, 15 per cent.; other wrought iron tubes or pipes $\frac{3}{16}$ cent per pound and 30 per cent.; safes, doors for safes and vaults, scales, balances and weighing beams of iron or steel, 35 per cent.; skates, 20 cents per pair and 30 per cent.; wire rope of iron or steel, not otherwise provided for, 25 per cent.; screws, commonly called "wood screws," 2 in. or over in length, 6 cents per lb.; one inch and less than 2 in., 8 cents per lb.; less than one inch, 11 cents per lb.; builders', cabinet makers' and carriage hardware and locks, tinsmiths' tools and harness makers' and saddlers' hardware, including curry combs, 35 per cent.; muskets, rifles and other firearms, and surgical instruments, 20 per cent.; iron or steel rivets, bolts with or without threads, or nut or bolt-blanks, less than $\frac{3}{8}$ in. in diameter, $1\frac{1}{2}$ cent per lb. and 30 per cent.; nails and spikes, wrought and pressed, galvanized or not, horse shoe nails, hob nails and wire nails and all other wrought iron or steel nails, not elsewhere specified, and horse, mule, or ox shoes, $1\frac{1}{2}$ cent per lb., but not less than 35 per cent.; cut tacks, brads or sprigs, not exceeding 16 ounces to the thousand, 2 cents per thousand; exceeding 16 ounces to the thousand, 2 cents per lb.; wrought iron or steel nuts and washers, iron or steel rivets, bolts with or without threads or nut and bolt-blanks, and finished hinges or hinge-blanks, not elsewhere specified, 1 cent per lb. and 25 per cent.; cut nails and spikes of iron or steel, 1 cent per lb.; Swedish rolled iron nail rods, under $\frac{1}{2}$ in. in diameter, for manufacture of horse shoe nails, 20 per cent.; iron or steel railway bars and rails for railways and tramways, of any form, punched or not punched, not elsewhere specified, \$6 per

ton; manufactures, articles or wares not specially enumerated or provided for, composed wholly or in part of iron or steel, and whether partly or wholly manufactured, 30 per cent.; screws, of iron, steel, brass or other metal, not otherwise provided for, 35 per cent.; sewing machines whole, or heads or parts of heads of sewing machines, \$3 each and 20 per cent.; axes of all kinds, adzes, hatchets and hammers not elsewhere specified, 35 per cent.; chopping axes, \$2 per doz., and 10 per cent.; garden rakes, two and three-pronged forks of all kinds, and hoes, 5 cents each and 25 per cent.; hay knives and four, five, and six-pronged forks of all kinds, \$2 per doz., and 20 per cent.; mowing machines, self-binding harvesters, harvesters without binders, binding attachments, reapers, sulky and walking ploughs, and all other agricultural machines and implements, not otherwise provided for, 35 per cent.; picks, mattocks, blacksmiths' hammers, sledges, track tools, wedges and crow bars of iron or steel, 1 cent per lb., and 25 per cent.; shovels and spades, and shovel and spade blanks, \$1 per doz., and 25 per cent.

Free Goods.—The following articles may be imported into Canada or taken out of warehouse for consumption free of duty:

Articles imported by and for the use of the Dominion Government or any of the departments thereof, or by and for the Senate or House of Commons, including arms, military clothing, musical instruments for bands, military stores, and munitions of war, imported by and for the use of the Army and Navy; or imported by the Dominion Government or through any of the departments thereof for the use of the Canadian militia; fire-brick, for use exclusively in processes of manufactures; anthracite coal; gannister; iron or steel rolled round wire rods under $\frac{1}{2}$ in. in diameter, when imported by wire manufacturers for use in their factories; locomotive tires of steel in the rough; rolled rods of steel under $\frac{1}{2}$ in. in diameter or under $\frac{1}{2}$ in. square, when imported by knob or lock manufacturers or cutlers for use exclusively in such manufactures in their own factories; steel rails, weighing not less than 25 pounds per linear yard, for use in railway tracks; steel valued at $2\frac{1}{2}$ cents per pound and upwards for use in the manufacture of skates; scrap iron and scrap steel, old and fit only to be re-manufactured, being part of or recovered from any vessel wrecked in waters subject to the jurisdiction of Canada; steel bowls for cream separators; steel for the manufacture of files, when imported by file manufacturers for use in their factories; wire of iron or steel, galvanized or tinned, No. 16 gauge or smaller.

The foregoing act went into force on the 13th May, 1887, and applied to all goods imported or taken out of warehouse for consumption on or after the said day; but all goods actually purchased on or before May 13th at any place out of Canada, for importation into Canada, on evidence to the satisfaction of the Minister of Customs of the purchase having been so made, and all goods in warehouse in Canada on that day, could be entered for duty until July 1st, or in the case of goods, at the rate of duty in force immediately previous. From the United Kingdom or any British possession, carried by way of Cape Horn, to be entered in British Columbia until November 1st, 1887.

It is reported that Chief Justice Henry, of Ottawa, has again opened up his gold property in the Wine Harbour district, Nova Scotia. This mine has yielded good returns in the past.

The Phosphate Beds of South Carolina.

Mr. Frederick Stearns, Charleston, S. C. writes*: "A short journey of fifteen miles by the South Carolina Railroad brought me via Summerville (the centre of the recent earthquake action) to Lamb's, a private station on the Ashley River, where the works of the Charlestown Mining and Manufacturing Company are situated, and through the courtesy of Col. Joseph A. Yates, superintendent, and his assistant, Mr. W. M. Wallace, I was enabled to study the deposits of phosphatic rock which underlies or rather overlies this whole region, and as well to note the process of mining, washing, drying and preparing it for use. The whole coast region seems to have once been the bed of a shallow inland sea, and over a compact bed of marl, some forty or more feet in depth there lies a deposit of phosphate of lime from eighteen to thirty-six inches thick. This is just below the recent soil and sand. It is reached by stripping the surface till at a depth of fifteen to twenty inches the deposit is found. The phosphate is in the form of nodular concretions, from the size of one's head down to coarse gravel, about sixty per cent. of it being sand and marshy humus. This is loaded on to tramway cars and hauled on an inclined road to the top of the washing house. From the cars it is dumped into long troughs—inverted pyramids—at the bottom of which are large revolving shafts armed with steel teeth, which serve to break up the large lumps into smaller ones and return the whole into lower troughs, in which revolve other shafts armed with paddles, spirally arranged, to carry the phosphate forward and deliver it on to a screen inclined at an angle of 45 degrees, from which it falls to the floor. During all this time it is treated with sprays of water and the dirt and sand are borne off in a contrary direction by a suitable reverse slant in the troughs.

The damp, but clean, phosphatic rock is then shoveled into barrows and wheeled into the upper part of large brick kilns about 60x100 feet and twenty-five feet high. The kiln is first prepared by spreading on the bottom a layer of washed phosphate pebbles, two feet thick. In this are laid iron flues to give air, and over these a pile of firewood (southern pine) two feet thick, and then on this the phosphatic rock is tumbled from the barrows above until it reaches ten to twelve feet thick, about 400 tons to a kiln. The mass then being ignited from the flues, burns slowly, and when consumed the moisture of the pile is driven off, and the rock is ready for shipment and sale to the fertilizer establishments, which, by processes peculiar to each, treat it with sulphuric acid, to free or to make more soluble the phosphoric acid it contains. It is then ready for use by the planter.

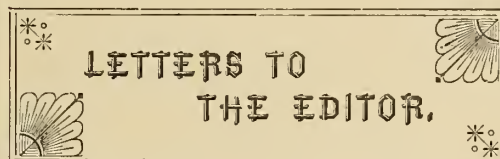
The two establishments operated by this company produce 125,000 tons of the rock annually. The profit is somewhere about 20 per cent. on the capital invested. The limit of production is only bound by the demand. The price ranges from \$7 per ton to (now) about \$4 per ton. Analysis of the washed rock show: Dirt, one to three per cent.; silica, in form of coarse white sand, twelve to fifteen per cent; lime, forty-one per cent.; phosphoric acid, twenty-seven to thirty per cent. The color of this curious deposit is from a cream yellow to a coarse brown orange, forming irregular concretions. Its source is evidently from the marine animal life, which in former geological ages abounded in this then shallow sea. The fossilized vertebra and teeth of fish and some

animals abound in it. I gathered triangular teeth of sharks measuring four inches on each size, indicating monsters of that period that must have been whalelike in size. These teeth are as perfect as when shed, highly polished, with razor-like sharp edges, finely serrated.

The discovery and development of these riches occurred soon after the war and afforded the impoverished people a source of income, and wealth that proved to be more valuable than gold mines.

Negro laborers are employed entirely and are found of late years tractable, industrious, and work to the entire satisfaction of their employers when treated justly and with consideration.

There are seven large mines in this region, the output of which goes largely to Europe. Other deposits are under water and are dredged for, but otherwise are treated as are those of dry diggings.



The Megantic Mining Company.

MONTREAL, December 5th, 1887.

The Editor

THE CANADIAN MINING REVIEW.

SIR,—I notice in the November issue of your Journal, an exhaustive report upon the Asbestos industry of Canada, by Dr. R. W. Ellis of the Geological Survey, of Canada, and as this very important branch of trade has lately received a great impetus, owing to the increased demand for this valuable product, which now enters so largely into the manufacture of certain classes of goods. I take pleasure in submitting some additional information which may be of interest to your numerous patrons.

During the time which has elapsed since Dr. Ellis' made his report, marked progress has been made in the development of several of the locations to which allusion has been made, and large quantities of Asbestos have been shipped to the United States, Germany and other foreign ports.

The Megantic Mining Company's Mine, one mile from Coleraine, which a year ago was only a mere prospect, has recently developed into a very rich property, and may be classed to-day as one of the most valuable of its kind in Canada. Judging from the innumerable veins of Asbestos, now in sight, ranging from one-half inch to three inches, and taking into account the large quantity which has been extracted and shipped, while prosecuting the work of development, leaves no doubt in the mind of any one who has seen the property, as to the great future that may be confidently anticipated for it. The company has pushed forward the work of development with great rapidity, and to facilitate the removal of the earth and rock they have laid down 668 feet of tracks, from the extreme ends of dumps. They have also opened a road from the mine to Coleraine Station, a distance of one mile and a quarter, the greater portion of which will in the future, be kept in good condition by the county, as it now forms part of a new road opened from New Ireland to Coleraine Station.

There are some very important features as to the quality of Asbestos found on this property, which deserve special mention, viz: the extreme

fineness of the fibre, which is equal to that of the finest silk, while its length makes it more valuable for spinning purposes. These desirable qualities will add materially to the value of the Canadian Asbestos when placed in competition with Italian, and largely increase the output, by securing for our product the preference, in point of excellence, as long, fine fibres command a more ready sale, at a greatly increased price over the inferior grades. The mines east of Coleraine have produced a quality of Asbestos, which has already gained a high reputation abroad, and the more recent magnificent discovery at Coleraine, places Canada in a position to compete against the world.

Great credit is due to the management of the Megantic Mining Company for the spirit of enterprise which they have exhibited in developing this important industry. They have had a large staff employed during the past season, and owing to their indefatigable efforts and the distribution of money among the labouring classes, a small village has sprung up at Coleraine, and not the least conspicuous of the many cottages is the neat and substantial looking residence of Mr. J. S. Drysdale, the Superintendent of the company, which is also used as their offices.

Yours very truly,
G. W. GRANT.

Alleged Conspiracy to Defraud the Tumbo Coal Mining Company.

Much excitement has been created in Victoria, B. C., over the arrest of W. G. Campbell, who represents himself as a mining expert, and Geo. Kennedy of the Brunswick hotel, on a charge of conspiring to defraud the Tumbo Coal Mining Company. It is stated that the prisoners received nearly \$8,000 under false pretences.

Our space this month is too limited to admit of anything like a detailed account of the proceedings in the Police Court; but the following is a brief *resumé* of the principal evidence adduced so far:—

Chas. Gabriel, sworn, said:—Am a merchant; know the defendants; became acquainted with them in this way: Sometime about November or December last year, Mr. Olsen brought Mr. Kennedy to my store, and they informed me that they had discovered on Tumbo island croppings of coal, samples of which they showed me; after a long talk with them about the quality and quantity of the coal, I told them I would look into the matter and if there was anything in it I would get help to develop the mine. I then got Mr. Dennis Harris to go in with me to furnish the capital, in consideration that Olsen and Kennedy would give us half of the mine, to which they both agreed. Soon after that Mr. W. Lang and Mr. Olsen brought Mr. Campbell to my house on Sunday and represented him to be a coal expert. Mr. Campbell said he and Mr. Kennedy had discovered the coal and he would like me to send him up to look at it; I informed him that I had already sent some Japanese up there, when he informed me that no one but an expert like himself could give a report; he was also an assayer and could give a good report as to the quality of the coal. I told him I did not need his services. Some days afterwards Mr. Olsen brought me a piece of paper to my store, telling me it was the report of an assay made by Mr. Campbell, on the coal; I believe Kennedy was with Olsen when the assay was shown to me: I then told them that I would like to see Mr. Campbell, and when he came I asked him what was his opinion on the assay he had handed to some gentlemen; he informed me that it could not be better (Mr. Olsen and Mr. Kennedy were present). Witness told Kennedy as he had such a good opinion of the mine, if he was willing to help us develop and report on it, we would make him a partner, giving him one-sixth interest in the mine; he then told me that he would not accept those terms, as he was engaged by Mr. Sanders and others to go up and report on some anthracite coal which had been discovered, but he would go up there and report on the mine, if he had time, before the Boscowitz sailed for the north; a few days after he came to the store and asked me how much I would give him if he would go and make a report; told

him that we had decided not to send anyone there unless he would take a share in payment; he went away, but came back a few days after, and I asked Kennedy and Olsen if they were willing to give Campbell a part of their share; Campbell informed me that the parties who were to send him up north were not ready, and he would accept one-sixth share in the mine as payment for prospecting the mine; he said that he was sent up here expressly by capitalists of San Francisco, who represented thousands and millions of dollars, to look after coal and other minerals, and that on his report two men in San Francisco would invest any amount; he said the same thing in the presence of Mr. Sayward; Mr. Sayward and I then signed the agreement and sent him up on the steamer Hope, which we chartered. Mr. Kennedy, Mr. Olsen and I accompanied him. After Campbell had inspected the island, he then informed me that he was satisfied as to the value of the property; he was in company with Kennedy all the time we were on the island; I was alone on the beach, when Campbell came to me and said that the company was very foolish to give Kennedy and Olsen so much out of the mine as their share, which was half of the mine, they supplying no capital; they would find no man to give us what we were giving them; he would advise the company to buy them out and get the mine to ourselves; when we reached the steamer coming back to Victoria, I asked Campbell how much he thought it would be fair to give to Kennedy and Olsen; he told me \$10,000 would be a fair price for their share, as the property was worth not less than \$25,000, without touching a stone on it. I then asked him if he had told Kennedy the value of the mine, and he said no, as he was not employed by him but by the company; he would give no information to Olsen or Kennedy as to his report, and when he handed that in the company could do what they liked with it. He gave me to understand that he would keep his knowledge of the value of the mine from Olsen and Kennedy. About a week after our return Campbell, Kennedy and Olsen came to my store several times, and Kennedy seems to have been annoyed at me for keeping what Campbell said to me about the mine, and said that he did not think much of Campbell because he would not give him the information contained in the report; Campbell came after and said that Kennedy had insulted him and treated him shamefully for not telling him and Olsen his opinion of the mine; they were not on speaking terms, but he (Campbell) did not care for Kennedy so long as he was working in the interest of the company; a few days after Kennedy and Campbell were in the store, but they would not speak to one another; the latter brought his report and I asked him whether Kennedy or Olsen knew the nature of it and he said no; the company, composed of W. P. Sayward, T. B. Hall and myself, held a meeting; Campbell was present and so was Kennedy, but they were to all appearances bitter enemies; Campbell said that the mine was worth \$25,000 and advised the company, known as the Tumbo Island Coal Company, to buy Kennedy and Olsen out for \$10,000; on his representation we made arrangements to purchase the share of Kennedy and Olsen for \$7,500, to be paid by note for \$5,000 and \$2,500 after; we subsequently paid \$3,750 in cash, less \$100 for discount; the balance of \$1,250 was placed to the credit of Mr. Olsen; he has received it by several payments. Kennedy's interest in the mine ceased when we paid the \$3,750, as he said he wanted to go to the Alaska mine with two of his friends; he never left the city, and after several meetings of the company with Campbell as to the development of the mine, we sent him up to the island to make a survey as to where we could sink a shaft; he came back with a man named Isaac Tatton, who lives on the island, and informed the company that where the shaft was to be sunk was on Mr. Tatton's land, and that he had refused to allow the company to sink a shaft there unless they paid for it, and that he had brought Tatton down with him, so that the company could make their arrangements with him. I asked him whether we could not dig the shaft on our own land, and if we did, would it not cost less. Campbell advised us strongly to give \$500, which he said Tatton demanded; if the company did not do so it would cost them a very large amount of money; we were under the impression up to that time that we could prospect on any part of the island; after some time the company agreed to pay Tatton the \$500; I told him to call at my store and I would give him a check; he did so, and I handed him a check on the Bank of B. N. A.; when I left the meeting I left Tatton and Campbell in Mr. Sayward's office; about a couple of weeks ago I had occasion to go to Tumbo Island, and, in consequence of what I heard from Mr. Tatton, I brought him to Victoria; after we got here I saw Mr. Sayward and Mr. Hall and they advised me to take Tatton to Mr. Mills; after this I saw Mr. Olsen and took him to Mr. Mills' office, where he made a declaration; I took the same course with Mr. Lang; Mr. Campbell informed Mr. Sayward and myself that he was in correspondence with a Mr. Pearce, in England, and he was coming out to ne-

gotiate for the mine; he showed us a letter which he said he had received from Mr. Pearce, and that he was to go to Port Townsend to meet him and take him to Tumbo Island; Campbell wanted us to send a boat to the island, and as we had an occasion to send a man there, we sent Kennedy; Kennedy told me that Campbell had arranged with him to take the boat from Tumbo Island to Orcas Island. Campbell told us that Mr. Pearce and he waited two days on Oscar Island, and that Kennedy never brought the boat there and Mr. Pearce had to return. Kennedy brought a bill for his services and charged \$3.50 per day. Campbell brought a bill for the expenses of himself and Mr. Pearce.

Cross-examined—On Mr. Campbell's report we were to sink 350 or 400 feet; we have gone down 20 or 24 feet. Campbell has not received money for his services, but for his expenses; am on bad terms with Campbell; slapped his face just before I went to Tumbo.

B. Olsen sworn, deposed as follows: Know Kennedy and Campbell, the prisoners; the former was watchman on board the ship *Rosenfeld*; she was wrecked opposite Tumbo Island; I was on the island for water and provisions and got well acquainted there; the time we discovered the coal we were fishing; there was no one except Kennedy and myself on the ship; we discovered the coal about six or eight feet from the water's edge; we went for days and days after that, following the ledge up for over half a mile; came to Victoria and told that we had struck a pretty good thing; spoke to Mr. Gabriel first; Kennedy was not with me and he did not know I was going to Gabriel; the latter made the remark that I need not go to Mr. Dunsinnir, as he could find money; called on Mr. Harris, of Lowenberg, Harris & Co.; made arrangements with him and Mr. Gabriel whereby they were to take half of the mine and keep it in order; had not seen Campbell; got acquainted with him in the Grand Pacific Hotel and had a conversation with him; he acted as though he wished to buy from me; Campbell told me I was very foolish to have anything to do with Mr. Harris and Mr. Gabriel. After Campbell came down from the island, he said there was nothing there. He came up to my house one time with Kennedy and was very down on me, because I would not stick up for every cent of the money and give half to Campbell; the latter said he would give a good report because he wanted to make money on me and on the company; they threatened to kill me if I would not do as they wanted me to do. Campbell said to Kennedy in my presence that he would make a bogus report to the company; I do not know who sent Campbell to make a report, that is the company's business; Campbell and Kennedy would tell me nothing; have received money from the company; kept the money myself; Campbell and Kennedy wanted me to do as the latter had done, take all my money from Gabriel and divide with Campbell.

B. Olsen (recalled)—After the conversation, Campbell said he had made \$5,000 out of the business and would make \$5,000 more; it was like the snap of my finger. Campbell and Kennedy came to my house after and were angry with me; I got excited; they said I was a scoundrel; after Campbell got the money he told me there was no coal on Tumbo island.

Wallace Lang, sworn, said: Am a carpenter; formerly boarded at the Grand Pacific hotel; that was about last March; am slightly acquainted with a man named Dick; remember seeing him and Olsen; they were talking in the hotel and beckoned me to come over; Mr. Campbell was not there, nor did he come that day; he may have been in the hotel the next week; Campbell, Olsen and myself were together and Olsen wished Campbell to see Mr. Dennis R. Harris and Mr. Gabriel; took a walk to Mr. Harris' residence, but he was out, whereupon we went to Mr. Gabriel's house and he informed us that he had had some Japanese on the island and was perfectly satisfied with their report; Mr. Olsen wished Campbell to look at the coal and give him an analysis of it and about a week after Olsen came to me at the hotel with a box of specimens; he did not know where Campbell lives and I showed him the house; when we got there, the latter looked at the specimens and said he would make an analysis, which Olsen could get in a few days; the company some time after this wanted to have an inspection of the island and Mr. Campbell, Mr. Kennedy, Mr. Gabriel and myself went up on the steamer Hope; that was on a Sunday; some time after that Olsen and I went to Mr. Campbell's house and he said the indications were good; previous to that, however, I heard him say that the mine was not of much account, although he said the croppings looked well; he told Olsen that he would have a good chance to sell and that he would make a good report; Kennedy was not present at the time; sometime after the sale was made—

Mr. Drake—Ah! how do you know about that?

Witness—Because Olsen told me he had to give a certain percentage to Mr. Campbell. I told him to keep his money in his pocket; went to Campbell's house, but

the conversation between him and Olsen was over when I got there; one thing I remember, though, is that Campbell said it was a cheap prospect; I afterwards went to Campbell's house with Kennedy and Olsen; we did not speak of the mine then, but on another occasion I had a piece of ore and Campbell said he would make a good report and have a chance to sell the mine; have seen Campbell and Olsen together four or five times; Campbell seemed very much pleased; Campbell and I did not continue on very good terms; we passed each other two or three times without speaking; remember going to Campbell's house when Olsen and Kennedy were there; there was not a friendly feeling existing towards me; remember Campbell saying after the return from Tumbo Island that the mine was not worth twenty cents; never heard him say that in the presence of Olsen; Campbell told me he was a mining engineer; he had good credentials, and as one of the Crocker family called upon him took him to be a *bona fide* engineer; neither Mr. Kennedy nor Mr. Campbell made a proposition to pay me any money at any time.

To the Court—Was promised an interest.

To Mr. Mills—It amounted to 1-12 interest in the mine.

Mr. Mills—Did Campbell ever tell you he had an interest in the mine?

Witness—No.

Mr. Mills—Well, if he didn't how could he give you an interest in the mine? Why don't you tell me the truth about this when I ask you?

His Honor—Was it under any agreement that Campbell promised you the interest?

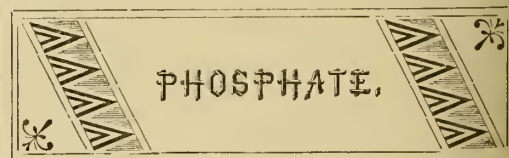
Witness—It was, as I had been the means of bringing Olsen to him.

To Mr. Mills—Spoke to Mr. Gabriel about the share I was to receive; yes, I was a little anxious about it; Campbell did not mention a price.

W. P. Sayward, sworn—I was introduced to Mr. Campbell by Mr. Gabriel, who said that he was an engineer; we wanted to know what Mr. Campbell would go the island for and I think he said he would go for \$50; this proposition was afterwards withdrawn and in lieu of it he was to get one-sixth share in the mine, to continue as mining engineer and make a report accordingly; he went up there and when he came back said the indications were as good as he had seen in any other coal mine; he said we were giving Kennedy and Olsen too much (that was one-half interest for working the mine) and thought it would be much more profitable for us to buy them out; he said he considered the property, as it stood, worth \$25,000 and by sinking and developing it he could get a large sum of money for it; he also thought if we could buy Kennedy and Olsen's half interest for \$10,000 it would be cheap enough; a bargain was finally made between Mr. Gabriel and Olsen and Kennedy for \$7,500, and one-half that money was paid to Mr. Kennedy; Campbell told me that Kennedy was offended with him and they were not on speaking terms, and gave a reason, but I do not remember what it was; he said that on more than one occasion, and he did not want to negotiate with Kennedy; this conversation took place after the return from Tumbo Island; Campbell said he was in correspondence with a man named Mr. Pearce, of London, who represented large capitalists; he said he went to Port Townsend to meet him and take him to Tumbo Island, but that the weather was so bad they got no farther than Orcas Island; the arrangements whereby Mr. Campbell and Mr. Pearce were to go to Tumbo Island were made with Mr. Gabriel; remember Isaac Tatton coming down to my office with regard to the \$500.

To the Court—Went up to Tumbo Island last December, but it was so wet that I could tell nothing about it; relied upon Campbell's judgment entirely; often had a talk with Mr. Kennedy.

The Court then adjourned.



In General.

Mr. F. S. Shirley, New Bedford, Mass., informs us that an horticulturalist of his acquaintance has tried ground phosphate in its raw state upon some of his plants with very encouraging results. A small quantity was mixed with the earth in the pots, and the difference in the growth of the plants compared with those not so treated has been very marked. Being cleanly and odorless ground phosphate, seems especially adapted for house plants.

Phosphate shipments from Montreal to November 23rd, 1887:—

Date.	Shippers.	Ship.	Destination.	Tons.
Nov. 16	Lomer, Rohr & Co.	s.s. Concordia	Glasgow.	118
" 16	Millar & Co.	s.s. Lake Ont.	Liverpool.	112
" 16	Wilson & Green.	do	do	156
" 18	Lomer, Rohr & Co.	s.s. Montreal	do	200
" 19	"	s.s. Lake Huron	do	200
" 19	Gilliespie Paterson	do	do	141
" 19	Wilson & Green.	do	do	132
Nov. 22	"	s.s. Scotland.	U. K. via N. Or can.	195
" 22	Lomer, Rohr & Co.	do	do	200
" 23	Millar & Co.	s.s. Katie.....	do	40
" 23	Wilson & Green.	do	do	96
Total...				1,590

Mr. Adolph Lomer, of Messrs. Lomer, Rohr & Co., of Montreal, sailed for England on the 26th ulto., on a business visit to England and Germany. This firm were the largest shippers of phosphate this year, having handled the production of the Emerald, Dominion and McLaurin & Blackburn's mines, their total shipments aggregating 8,744 tons.

Mr. F. Hilton Green, of Messrs. Wilson & Green of Montreal, sails for England on the 22d inst. This firm were the second largest shippers, being agents for the mines of the Phosphate of Lime Co., Capt. Boyd Smith and Mr. W. A. Allan. They exported 7,468 tons.

The Anglo-Canadian Phosphate Co. rank third, with an export of 2,025 tons, besides local sales, and Messrs. Millar & Co., who ship for the Union Mine, come fourth with a shipment of 1,267 tons, besides 287 tons sent to the United States.

Du Lievre District.

A visitor from the Emerald Mine reports that three new magnificent leads have been struck and that the older workings are doing very well. A bright green phosphate is being produced that makes a fine appearance and will give high analyses.

A vein of silicate of magnesia or mountain cork has also been found on this property. It is of the same family as asbestos and meerschauum and the men have been whittling pipes out of it. It is pure white in color, very light in weight and unbreakable by a fall. The discovery has excited much interest and the material is thought to be valuable.

The old cobbing house at No. 11 pit, High Rock mine, has been superseded by a new and more commodious structure 60x30. Inside have been placed two large circular screens or sieves through which all the ore passes, and by which the cobbing, formerly done by hand, is greatly facilitated. Twice the quantity is now handled in less than half the time taken by the old process.

No. 11 pit, or more correctly speaking, tunnel, running 250 feet into the hill on a 300 ft. level, and widening out at the end to a distance of 225 ft., is as rich as ever. Four air-drills are at work, and about 450 tons per month are being raised from it. The other pits on the top of the hill are all turning out satisfactorily. 140 men are employed, and after Christmas vacation the management contemplate putting on a full night shift in No. 11. The drills will be worked night and day, and the number of hands will be increased.

Mr. W. W. Pickford has had three men prospecting for a couple of months on what is known as the Portland East mine, located near the Emerald property and owned by the High Rock Company. A very promising show has been found, which Mr. Pickford will work in the Spring.

Through an unfortunate typographical error in our last issue, it was stated that the new cobbing-house at this mine was the tenth on the property. There are but three cobbing houses.

Some very promising shows have been opened on the Little Rapids property since our last. Work is carried on briskly, although with a very much reduced staff.

Despite the somewhat unfavorable nature of the weather of late, good progress has been made with the construction of the new Locks.

The ice which gave promise of being so good for travelling, has been rendered very unsafe by the soft weather and hauling has been much impeded thereby.

The Union and North Star are going ahead much as usual, but there is nothing special to report.

It is understood that during Christmas week operations will be generally suspended throughout the district.

Perth District.

The Anglo-Canadian Phosphate Co. have had encouraging success at the Otty Lake Mines the past month, having struck a seam of good phosphate six feet in width. The output for November was 129 tons, with only about 20 men employed.

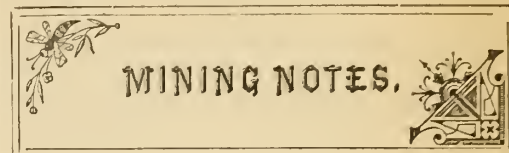
Templeton District.

The outlook of the Templeton and Blanche River Company of Montreal is reported encouraging. Up to the 28th of last month at least 250 tons of high grade ore had been taken out of the various pits. The Perkin's pit has been cleaned out, an excellent tramway built, two dumping wagons constructed, a first-class derrick and a comfortable cobbing house erected in connection therewith, and the pit, generally, made ready for effective winter work. Mining was begun there on Saturday the 28th ultimo, and the result has been very gratifying—four tons of the highest class mineral being the result of the first day's operations. If this pit continues productive the necessity of adding steam will have to be faced in about 30 days; and in any case, if the property is to be operated effectively, steam appliances should be brought in some time during the winter, the summer roads being impracticable for that purpose. The pits already opened are numbered 1, 2, 3, 4, 5, 6, 7, and the Perkin's pit, eight in all. Of these, 2 and 5 have temporarily given out; No. 7 and the Perkin's are being worked effectively and 1, 3, 4, and 6 still show good veins and may be taken up at any time; No. 1 has a solid floor of phosphate and is in a very advantageous position for winter work. A winter road has been constructed from the mines to the foot of Post's Hill, cutting off about 1½ miles of distance and several heavy rises, and hauling to the front will commence as soon as the Lakes and swamps are sufficiently strong to carry, which will be about the beginning of January.

The only other mine at present doing any work is that of Messrs. McLaurin & Blackburn,

who are carrying on operations with a very reduced staff. Mr. McLaurin has severed his connection with the property.

Work has been suspended for the winter at the mines of the Canada Industrial Co., Mr. Jackson Rae and Messrs. Gillespie & Patterson.



Newfoundland.

A lot of specimens of magnetic iron ore from Sandy Point, St. George's Bay, has reached St. Johns en route for England. The deposit is said to be very extensive, the ore cropping out on the face of the hill, running with well defined walls clear to the top of it. It runs then backward for a long but as yet unascertained distance. The lode is over one hundred feet wide and thousands of tons of ore could be taken off the face of the lode in sight. A number of men are prospecting, having strong reasons for assuming that coal will be found at no great distance from the deposit of iron.

Nova Scotia.

The adjourned meeting of the Nova Scotia Gold Miners' Association was held in the office of the *Critic*, Halifax, on Tuesday, 6th instant. The draft constitution and by-laws prepared by the temporal committee was submitted, and after some amendment adopted. The election of office bearers was postponed until the meeting in February, and the following were appointed an interim committee:—Hon. H. L. Wadsworth, Chairman, J. M. Reid, T. N. Baker, John Anderson and John McGuire.

The Oxford Gold Mining Co., from May to November of this year, have declared dividends amounting to 16% on their capital stock of \$125,000.

Mr. F. A. Wiswell, the late superintendent of the Essex Gold Mining Co., has leased the whole of that company's property, which has lately been lying idle, and with his usual push and enterprise, has already called for tenders for work on all the partly worked leads on that property, and also for prospecting others known to exist there.

The following are the official returns so far received at the Mines Office for the month of November:—

District.	Mill.	Tons Crushed.	Oz. Gold
Sherbrooke.....	Goldenville.....	205	48
"	Miners	200	71
"	Pactolus	150	23½
Lake Catcha	Oxford	61½	191½
Whiteburn	Cushing G. M. Co's.	27	27½
Salmon River.....	Dufferin.....	825	321

Work at the collieries of the counties of Pictou and Cumberland are particularly brisk for this season of the year, and the outlook for the future is very encouraging.

The Intercolonial Coal Mining Company are actively engaged in preparations for a largely increased output, having sunk their slopes 500 feet further, making a total depth of 3,200, probably the longest slope in the Province. They are also reopening their new shaft, the Scot Pit, the working of which will be extended as far as possible during winter, with a view to further development.

This company have recently secured the services of Mr. Charles Fergie, of Wigan, England, and doubtless this enterprising corporation will be able to compete successfully with the wealthy Acadia Coal Mining Company, operating the Acadia, Albion and Vale collieries.

The Acadia Company own a very valuable property, but in portions of it they are likely to have many serious difficulties to overcome. At the Albion, about seven years ago, a disastrous explosion occurred at the Foord Pit—a shaft 900 feet deep—after which the mine took fire, and the flames extended to the Cage Pit—another valuable mine connected with the Foord. These mines had to be flooded and abandoned. Efforts are now being made to re-open them. On 1st December the Cage Pit gave outward and visible evidence that the fire still exists, but even now that difficulty will soon be overcome, as the fire is being built off and confined as rapidly as possible. In the hands of General Manager H. S. Poole, the property ere long will probably be one of the finest in the Dominion.

At Spring Hill, Cumberland County, the Cumberland Coal and Railway Co. continue to extend their already extensive works, being at present engaged sinking to another seam of coal. On November 30th the largest output of coal ever made at any mine in Nova Scotia in one day was made at these mines, the quantity being 2,683 tons.

The opening of the Joggins Branch Railway is likely to prove highly beneficial to the Joggins mines. The company has been reorganized and General Manager McNaughton is now advertising for fifty experienced coal miners.

Mr. John H. Harding, of St. John, N.B., is reported to have formed a company in Montreal to work a manganese deposit in Maitland on the Shubenacadi River. The capital of the company is \$10,000, consisting of 1,000 shares of \$10 each. Manganese is used for bleaching, painting, colouring glass and a number of other useful purposes, and the demand, therefore, is gradually increasing. Such is the enquiry for this useful metal that Mr. Harding has been offered \$80 per ton for all he can produce.

New Brunswick.

Some quantities of ore recently taken from the Glebe Manganese property, owned by Messrs. F. J. Alley and others, of Bar Harbor, Maine, is valued at \$200 per ton.

Latest reports from the Mineral Vale mine, New Ireland, announce that concentrating machinery of the latest and most approved pattern is shortly to be put in by the proprietor.

The output from Major Markham's Manganese property continues satisfactory.

Prospecting for antimony in the neighborhood of Springfield has recently been carried on by Gilbert Grundall, of Moncton, and others, it is said, with encouraging results.

Negotiations for the sale of the extensive Manganese deposits at Jordan Mountain are nearing completion. Baltimore people are expected to give \$40,000 in cash to the present proprietors.

Quebec.

On Thanksgiving Day Mr. O. Spencer, of Calumet Island, discovered a mineral deposit on his land, which is believed to be of a valuable character. From what we learn the ore resembles very much that of the Lawn Mine, only it is of finer grain. It is said to contain silver and a superior grade of copper, but this conclusion is merely from conjecture as no analysis has as yet been made. The deposit is situated on lots 12 and 13 in the 5th range of the island. Several tons of the ore are lying loose on the surface in the vicinity of the vein which is said to indicate the presence of a large deposit. We have heard that Mr. Spencer has refused an offer of \$600 for the mineral right.

Iron has been found on the farm of Mr. John McTiernan, Clarendon.

At the Villeneuve mica mines a new hoisting engine and another drill has been added to the plant. The present output is reported to be close upon 2,000 lbs. per week.

A typographical error last month made the output from this mine in tons instead of pounds. The paragraph should have read 3,400 lbs.

The gold mining operations in the Buckingham district have ceased. Work will be resumed by Captain Bothwell, and the Syndicate in the spring.

A dispute between Mr. Church, of Aylmer, and a German named Louis Redant, about the possession of a mica property in the Township of Cawood has been settled at the suggestion of Mr. Clarke, the Crown Lands Agent. Both parties have agreed to a division of the property.

At the South Ham Antimony Mine, near Lake Nicolet, the proprietor, Dr. Reed, has, during the past season, driven in an adit 304 feet long—6 + 7 from the base of the hill in which the ore is located—striking the bottom of the deepest shaft, now 100 feet. All the works are now thoroughly drained and ventilated, and pumping is now no longer necessary. The mine can be most economically worked for several years by following east and west on the vein which has been traced on the surface about 1,200 feet. The adit runs nearly north, striking the vein rich at 100 feet from the surface.

Mr. A. M. Evans, M.E., of Cardiff, Wales, at the request of English capitalists, examined the property in the early part of last month and reports very favorably upon it, stating that the measure is about 70 feet broad and will yield antimony in paying quantities, some portions giving very rich ore as high as 80 per cent. An approximate estimate shows that two million tons of ore may be expected from the measure if taken at a depth of 100 yards, and so far as can be ascertained there is no reason to expect it to terminate at three times this depth. Mr. Evans advises the smelting of the ore at the mine, with charcoal, to be made out of the immense quantities of timber on the property.

The miners are now driving eastwards on the vein taking out splendid ore, which is to be piled up until five or six hundred tons of first-class ore have been mined, when the erection of suitable concentrating and smelting machinery will be considered. The property is

located in the middle of a district rich in asbestos, copper, iron, soapstone and other minerals, and hopes are entertained that the Dominion Lime Company's railway will very soon be pushed into close proximity to the property. The people of Wolfe County are much indebted to their worthy members, W. B. Ives, M.P., and R. N. Hall, M.P., for the interest they have taken in this new line. The subsidy from the Dominion Government was in very large measure due to their efforts.

New acid works are in course of construction by G. H. Nichols & Co., at the copper and nickel mines at Orford, and are nearly completed. The manufacture of sulphuric acid is expected to commence within a short time.

According to the Sherbrooke *Examiner*, the owners of the Orford mine are putting in new machinery on their property, which, until recently, was owned by the Orford Copper and Sulphur Company. It is now in a prosperous condition and continues to yield large quantities of ore. From 1,500 to 1,600 tons are shipped monthly to New York, and there are reasons to believe that the output will increase in the near future.

The high grade ore mined at the Cowan & Ray mine last year has been shipped to Montreal this season by Mr. S. P. Franchot.

Ontario.

At Malone, a station on the Central Ontario Railway, the old Feigle Mine has been worked to some extent during the past season. The quartz was milled at the Gladstone Stamp Mill and some good results obtained (the Feigle and Gladstone properties are both on the same vein), but the parties doing this work not being able to obtain a lease from the Feigle Company the work has been stopped. At the same mill several hundred tons of concentrates, left by the lessees of the Consolidated, were roasted in an experimental muffle furnace for the purpose, and it is said very encouraging results, both as to gold and arsenic, were obtained. We understand that a furnace of the same description has recently been erected at the Consolidated.

At the Richardson Mine, near Eldorado, in the Township of Madoc, a shaft has been sunk nearly 90 feet, disclosing a body of quartz some 30 feet in width, but the length has yet to be ascertained. About 100 tons of the ore was milled at the Bannockburn Stamp Mill, but we have not heard with what result.

A mica mine has been opened in the Township of Hungerford. The mica occurs in quartz or felthspathic dykes, and it is clear and white while the chrystals are of a good size. This property promises well, and no doubt if properly worked will yield good returns. So far insufficient capital has hindered operations being conducted to any great extent.

On lots 7 and 8, in the 11th concession of Elzevir, are found three very large deposits actinolite intermixed with asbestos of a very fair quality. The fibre is, however, short. Some 300 tons have been milled at Bridgewater for use as fire proof paint, roofing and felting.

Very little during the past season has been done in iron mining in this section of the province. Nothing has been done at any of the mines in which the Central Ontario is interested, with the exception of the St. Charles Mine, in

the Township of Tudor, where some work is being done. This mine promises well.

Explorations were made on the property of the once famous Blairton mines, near Marmora. Many new discoveries of magnetic and hematite iron have been made.

A sample of gold-bearing quartz, taken from the Ranger Mine, near Sudbury, on October 13th, has been received at the Geological Museum. It is a lump of hard grey rock about twice the size of a brick, with little splashes of yellow metal imbedded here and there in the side of a fresh fracture. The Ranger Mine is about twenty miles from Sudbury, on the Algoma branch of the C.P.R. The specimen is the property of Mr. Tough.

Local papers state that Messrs. Tough & Frawley, in order to make sure of their gold location, have erected a shanty directly upon the vein and placed two men in charge armed with Winchester repeating rifles. The property includes 900 acres.

Prospecting around Sudbury has stopped for the winter, but there is much confidence felt in the gold find there, and the spring will doubtless see a good deal of activity in the mining transactions thereabouts.

A valuable discovery of silver, about 12 miles from Sault St. Marie, is reported. The vein is 5 feet thick and 2 shafts are being sunk. It is said that a company with a capital stock of \$500,000 has been formed to work the property.

A meeting of the directors of the Kingston and Pembroke Mining Company was held at New York on the 15th instant. A report of the operations for the first six months was presented. It was shown that 22,000 tons of ore had been mined at a net profit of \$14,000. The result was considered satisfactory, although not so favorable as had been expected. One mine showed sulphur, and its output was not of great value. A large sum of money was spent in development work, and in another mine a new vein has been struck which is sixteen feet thick. The company own the mineral lands along the line of the Kingston and Pembroke Railroad.

Port Arthur District.

The more prominent occurrences to report during the past month are the continued taking up of large tracts of iron lands, more especially by Americans, on Hunters Island, and the rich developments of the new Rothwell vein, about four miles north-east of the famous Beaver Mine.

The manager reports that he has "struck it rich" quite close to the surfaces—the ore showing considerable argentite and a little native. The prediction of the Director of the Geological Survey that numerous other veins would probably be found which would be just as likely to be prototypes of the Beaver is being rapidly verified.

The Beaver mine having passed into the control of the new "Beaver Milling and Mining Co.," General Hecker U. S. A. has taken the position of manager, and doubtless Mr. Kirkland will ere long try his luck on some of the other prospects owned by millionaire Peters and himself in the Whitefish Lake region, west of Silver Mountain.

Funds are being raised to improve the communication between the Silver Mountain mine—the present terminus of the government road—and the rich deposits north west of Whitefish Lake and in the Attick Lake districts. Already about \$300 have been raised and the government are expected to contribute \$600 more.

To assist prospectors and others in taking up land, the Ontario government are having a base line run from Whitefish Lake to Hunters Island on the International boundary through the Silver and Iron region, and have also made preparation to have the International boundary traversed between Arrow Lake and Hunters Island, in the Thunder Bay and Rainy River district.

The output at the Beaver, Rabbit Mountain and Silver Mountain mines, owing to the steady enlargement and improved machinery continues to grow daily more satisfactory.

In the departure of Mr. W. H. Furlong M.E. the district loses a most reliable and experienced engineer. From his association, professionally with the famous Silver Islet and Beaver mines, and his familiarity with the various important gold mining regions of the Western States, and his studious disposition, he has acquired a vast fund of information which will be of great service in the new region he has chosen viz: the new inland gold fields of Africa, which are at present attracting so much attention.

Manitoba and North-West Territories.

It is the intention of the Medicine Hat Railway & Coal Company to sink a shaft on their property, and to lay a standard gauge track to connect their mine with the C. P. R. in the spring.

Mining on the Saskatchewan has not been very brisk during the past season, and the little that has been going on has now closed down for the winter. Some ten or twelve men were at work, most of them between Edmonton and Victoria, making from \$5 to \$6 a day.

On the North Saskatchewan River, in the North-West Territory of Canada, about 80 miles above the town of Edmonton, Alberta, there is an interesting example of naturally reduced iron. Along the river bank a lignite formation crops out for several miles, overlaid by clay shales and soft argillaceous sandstones containing nodules of clay ironstone. These nodules are similar to others found at Edmonton, and prove by analysis to be carbonates of iron, containing 34.98 per cent. of metallic iron. The Saskatchewan seam of lignite has at some time or other been burnt, leaving a bed of ashes, clinkers and burnt clay, in places 20 ft. thick, and now covered by a dense growth of grass and underwood. From this mass of burnt clay pieces of metallic iron can be picked out, weighing in some cases 15 or 20 pounds. They have evidently been reduced from the nodules above mentioned by the heat of the burning lignite. Most of the pieces of iron are much rusted; but when scratched with a file they show a bright surface. The observation is interesting, and to some may help to explain how primitive man originally discovered the reduction of iron ore.

British Columbia.

At the Quesnelle Quartz Mining Company's property work has been carried on by continuing

the shaft down 50 feet further; also a cross cut was run of about 60 feet at right angles from the main drift, the same formation continuing as at the 150 foot level. As it is difficult to get supplies and necessary machinery to work sulphurets, work will be suspended for the winter. The mine prospects well, but it will require more money and skilled labour to be expended on it before pay can reasonably be expected. The present shareholders have more faith than funds, and faith without funds goes only a short way in developing a mining property in British Columbia.

Mr. James Gray, manager for the Ophir B. d. Rock Flume Company, operating in the Big Bend of the Columbia River, has obtained a considerable quantity of gold in nuggets, ranging in value from 25c. up to \$10 and \$15. Gold is found in considerable quantities on the claim which this enterprising company is working. The camp is now an established concern, and when the wash-up for the season takes place it is believed the result will be astonishing.

The outlook for quartz mining in British Columbia never was brighter. If only a few railroads were pushed through the country the results in mining would be astonishing.

The total shipments of coal by Messrs. Dunsuir & Sons, of the Wellington collieries, for the month of November, aggregated 23,832, representing an output of nearly 1,000 tons for each working day. Of this large aggregate, 17,309 tons were shipped foreign and 6,523 tons were local shipments. It is expected that even this large output from the Wellington collieries will be still further increased.

A remarkable specimen of argentiferous galena extracted from the property of the Selkirk M. and S. Co. at Illecillewaet, was recently on exhibition in Victoria. The piece, which is entirely free from quartz, weighs over a quarter of a ton, and is pure metal composed of silver and lead, carrying 81½% of the latter and 77 ozs. of the former to the ton. It is a piece of a block that weighed, it is said, quite a ton.

United States.

The roasting of Canadian iron ores is to be prosecuted in Cleveland on a more extensive scale than heretofore. Besides the roasting oven put up some time since, a new and improved one is being erected by the Cleveland Rolling Mill Company. It will be ready for use very soon.

MISCELLANY.

The Algoma Silver District.—Writing to the *Mining Journal*, London, Eng., Mr. Charles W. F. Crauford contributes a very valuable article on the silver mines in the neighbourhood of Port Arthur. Here are a few extracts: "The whole country seems to teem with mineral wealth. Lead and copper, however, appear to make to the east, while the richest silver deposits would seem to lie along a line stretching away to the south-west of the White Fish Lake, 40 miles from Port Arthur, and beyond that to the Arrow Lake, 30 miles further. A very large number of rich discoveries are reported in districts along this line. Owing

to the lack of capital necessary to do the exploratory work, almost all these promising veins are lying dormant. On our visit to the Beaver Mine, 18 miles distant, Captain Williams kindly took us underground, when, after mounting some 20 or 25 feet up the hillside, we entered the deep adit. The usual mistakes seem to have been made in the early development of the mine. The vein broke up into strings and was lost for some time, till cross-cutting in the direction indicated by the upper workings, a bonanza was struck, and some \$2,000,000 worth of ore was opened up in five months. From this out the history of the mine has been a veritable romance. Levels have been driven in solid ore 6 or 7 feet wide by 7 high, worth at least \$1,000 per running foot of the level; pockets of virgin silver have been met with where the bits could not drill owing to their being stopped by lumps of the pure metal, and prills worth \$6,000 to \$7,000 a ton have been barrelled and sent to the smelting works; indeed, we were shown a single barrel said to contain ore worth £2,000. The country rock enclosing this remarkable vein is a black, very carbonaceous, and much jointed, argillaceous shale, conjectured to be of the Cambrian age. The lode, which is two or three feet wide in its narrowest part, swelling in many places to seven or eight, and averaging at least five, is enclosed between well-defined walls, and is nearly vertical. Its metalliferous contents are principally silver glance, with very considerable deposits of native silver, a proportion of rich galena carrying from 700 to 1,000 ounces of silver to the ton, together with a certain amount of zinc blend, worth quite 1,000 ounces of silver per ton, and also a small quantity of iron pyrites. Captain Williams informed us that owing to the soft nature of the vein-stuff no mine in Cornwall can do its stoping so cheaply; 7s. 6d. is all that it is estimated to cost per fathom for breaking away the lode. This rich ore chute measures quite 200 feet along the drifts, and as at present 100 feet of vertical depth of the bonanza has been developed. Taking the average width of the vein as five feet, this would give about 800 tons of rich ore in the backs above the adit. Anyone who has seen the deposit would not be surprised to hear that 250 ounces of silver per ton is considered a very moderate estimate, which would give about 2,000,000 ounces as the contents of this block of ground. Beyond this, however, the shaft has been sunk 40 feet, still continuing in rich ore. About a mile and a-half south-east from the Beaver is the Rabbit Mountain mine, owned and worked by a St. Paul company. It carries a magnificent 5-foot vein, from which a large amount of silver has been extracted. South-west of the Beaver is the very promising Porcupine vein. The adits and shafts in this mine show the same rich ore as is found at the Rabbit and Beaver. This mine has been sold to a Detroit syndicate, who intend pushing work vigorously at once. From enquiries I have made, development may be estimated at \$25 per foot, taking roughly that there would be one foot of shaft to three feet of drift. This estimate includes superintendence, building the rough log shanties, chopping out roads, and, in fact, everything. \$25,000 would, as I understand, be an adequate sum to prove or disprove the value of any one of these properties, as this would give, roughly speaking, 1,000 feet of workings. Some 16 miles west from these mines is the Silver Mountain mine, now being worked by a Liverpool company. Not having visited the mine, I cannot, of course, speak from my own observation, but from specimens shown to me it would appear to be a valuable property. It is some-

what mortifying to reflect that British capital has hitherto been forestalled, and that American companies are the proprietors of the richest of these mines; and that in the case of the Beaver, the last of the original owners having been tempted to accept an offer of \$105,000 cash for his one-eighth share of the mine, they are netting the comfortable sum of \$1,500 per diem. And further, that within a few months, when the new stamps are in operation, it is no extravagant dream to suppose £300,000 will be flowing across the frontier from this mine alone. Since penning the foregoing I have learned that contracts have actually been signed for constructing the projected railway which is to open up that splendid silver district, and which will run from Port Arthur to meet the American line at the Tower iron field."

The Best Shape for a Blast Furnace.

—F. W. Lurnann† discusses the various interior forms of blast furnaces, with the object of determining the shape that offers the least resistance to a regular descent of the charge. The furnace which was found by experiment to give the best results was of the following dimensions: Height, 31 feet 7½ inches; diameter at the throat, 3 feet 7 inches; at the tuyeres, 4 feet 1 inch. There was no bosh, the furnace being cylindrical in shape to a height of 4 feet 1¼ inch, and then gradually narrowed towards the throat, the total diminution in diameter of 5·9 inches being spread over a height of 27 feet 6 inches. The furnace had a capacity of 353·17 cubic feet, and made, during the period between the end of August, 1885, and the commencement of December, 1886—about 460 days—2781·3 tons of grey, mottled and white charcoal pig iron of the highest quality, the production being thus at the rate of about six tons in the twenty-four hours. The capacity being 353·17 cubic feet, a ton of pig iron was produced with a furnace capacity of 58·9 cubic feet, as compared with a capacity of 106 cubic feet per ton of pig iron in large coke blast furnaces in Germany, and 353 cubic feet and upwards in the Cleveland district. The consumption of charcoal amounted to 1·113 ton per ton of pig iron, the charge yielding 46·9 per cent. of metal. The temperature of the blast was 400° C. After the furnace was blown out, the internal diameter was found to have been considerably enlarged in the neighbourhood of the tuyeres. The furnace was erected at Musen, in the Siegen district. The author concludes by expressing the hope that these experiments with blast furnaces without boshes will be continued with furnaces in which coke is the fuel employed.

Cost of Mining.‡—Much stress is laid upon the claim of cost, extravagance and losses in mining, by a certain class when the subject is under discussion. Statements are often made concerning the amount of money put into mines in order to bring a little out, and other comparisons which are odious, not because they are comparisons, but because they are not. In the first place it may be safely stated that the money expended in the actual development is paid to a class of hard-working men and contributes not only to their support, however unwise their expenditure of what they receive, but also goes to some extent to the maintenance of other branches of business, some of which might, however, be allowed to starve to death to the advantage of the whole locality. Outside of the money expended in the legitimate development of the mines there are and have been large sums of money spent which cannot be justly charged

to the account of mining. The items under the head of expense account which a young superintendent, fresh, perhaps, from school, and knowing nothing of mines, may spend in the luxurious furnishing of an office with plate mirrors, velvet carpets and fine furniture, and the purchasing of horses, carriage, wines, etc., cannot under any strict business law be fairly added to the cost of mining. In one sense, also, the expense of inexperience, which purchases machinery before there is a mine to be worked, or erects a costly plant for milling ores where a furnace is required, should not be added to the sum total of the legitimate cost of mining. Mining, when most intelligently and economically conducted, is an expensive industry. Large capital is required to insure success even where experience and ability of the highest order directs every operation. The business of extracting ores, in and of itself, is costly and difficult under the most favourable circumstances, so that it should not be forced to bear an additional burden in this direction for which it is in no sense responsible. Already there is noticeable a marked improvement in this direction. A better understanding more generally prevails. Business men are giving personal attention to their investments and are investigating more thoroughly than ever before the basis of the enterprises into which they are invited to put their capital. Under the dispensation which is rapidly removing the development of a mine from the speculative influence of the stock board to the domain of a practical, productive industry, a cloud of evils have taken flight and others are preparing for a hasty exodus. The abolishment of a long list of unnecessary expenses, with the reduction of the cost of transporting and treating ores will add largely to the value of mines and the profits of mining. Every successful method of treatment, every new line of railway, every new facility in the way of more available mill or furnace, improved machinery and every other improvement tends to decrease the cost of mining and, as a natural consequence, increase the value of the product and extend the producing capacity of the mines. These things give promise of most wonderful results in the future and establish beyond a doubt the security and permanence of the great industry.

What is Graphite?—Graphite is not lead, as its name plumbago and "black lead" would seem to indicate, nor is it a carburet of iron, as some works of scientific pretension still call it. Except that some impure specimens contain about as much iron as ordinary clay, it is the purest form of carbon, the diamond not excepted. Prof. W. Mattieu Williams believes that it is nothing else than extremely finely divided charcoal or soot; and reasons upon the subject as follows: The hand-rails on the staircases of the Metropolitan Railway stations, after some use, become coated with a delicate film of graphite or "black-leaded." The same is seen, but more faintly, on suburban hand-rails, but not at all in rural stations. "Whence comes this graphite film? Why is it developed as we approach the centre of London, reaching its maximum in the most densely populated and sootiest regions of the metropolis? My answer to these questions is, that it consists of a selection of the very finest particles of London soot. The hands of passengers in rubbing along these rails conduct a debtor and creditor transaction. There is soot-carbon on the hands and soot-carbon on the rails, as on every thing, animate or inanimate, that is exposed to a London atmosphere. Some of the soot-particles

on the rails are brushed off by the hands, some rubbed down and smeared on the wood; some are abstracted by the hands, and some are contributed by the hands as additions to the smearing. It is obvious that in such proceedings the coarser particles are those that will be brushed off or carried away, while only the finest, the impalpably minute particles, will adhere as a black, varnish-like, unctuous film to the hard wood." So, when the coarsest lamp-black or ordinary soot, the finest vegetable-black, and powdered plumbago, are rubbed upon paper, the appearance of the fine black will be found to be intermediate between that of the other two substances.

The Microscopical Structure of Iron.

—In a paper communicated to the German Iron and Steel Institute, Dr. H. Weeding states that the presence of even a very small quantity of manganese causes a marked change in the structure of the iron, producing a peculiar crystalline structure, in which the crystals are unsymmetrically arranged. This structure compels manufacturers of high-conductivity telegraph wire to avoid the presence

of any manganese in it. The author is of opinion that iron masters over-estimate the value of manganese, since this metal ought really to be dealt with as carefully as silicon. In describing the careful way in which it is necessary to prepare the sections, the author remarks that the temperature at which surface colouration ensues is dependant on the nature of the iron, and that he has found in his experiments that an iron containing but little silicon becomes far more rapidly discoloured than one containing a considerable proportion of that element, the temperatures given in text-books in relation to this point being wholly inaccurate. Iron rich in manganese is, on the other hand, more rapidly attacked than is an iron free from manganese. The best ground colour to give the specimen is yellow. In the discussion which ensued on the reading of the paper, S. Stein remarked on the change in the form of the crystals of pig iron when manganese is present, this element causing the iron to crystallise in rhombohedra instead of in octahedra, the form in which pig iron crystallises when free from manganese. On etching, it was found that iron-phosphorus and iron-silicon

alloys withstood the action of the etching agents far more than the purer pig iron. The presence of particles of these alloys in the pig iron becomes distinctly visible on etching the surface.

Men Who Win.

Five Hundred Dollars Thrown Away—His Aim Was Success

A good healthy body is almost sure to be found associated with a good conscience.

A close student of human nature is rarely willing to place large matters of trust in the hands of another, until he has seen the one whom he is to trust. He looks for the fresh health and vigor, the honest countenance and manly form, and in fact all that is attractive in men. He doubts the dyspeptic with sallow skin, drawn-out features, the evident weak and irritable nature. He feels as Shakespeare makes Julius Caesar say:

"Let me have men about me that are fat;
Sleek-headed men, and such as sleep o' nights;
You Cassius hath a lean and hungry look;
He thinks too much; such men are dangerous."

He does not doubt the honesty of the poor unfortunate, but he fears disease of the body will affect the mind, bring misfortune upon the individual, and loss to himself.

It may be injustice to the weak, but if the man has not the mental strength, or if he is wrapped up in his misery, he cannot take in the situation of the world, does not see that ideas are broadening, and that isms and teachings are advancing! How can an employer hope for success from such a man? The dyspeptic look, the wax-like complexion and sallow features show disease. The far-seeing man notes all these signs, and knows that the great light of man, the brain, is affected or will be, at no distant day.

He discards the poor victim of disease, who goes wearily out into the world. Discouraged at last he takes to his sick bed. He seeks medical aid. Lacking the broad ideas of the successful man of the world, he tries the same medical treatment that he has tried before. The same bigoted council is sought, the same drugs are administered by the same old family friend that treated him months and years before and his parents before him, and in such a way he drags out his miserable unsuccessful existence.

Is he to blame? Why not? When he sees daily, and hears from every side, proclamations of a remedy known as Warner's safe cure, which is becoming more popular daily, hourly, while he is becoming weaker.

J. A. Gettys, insurance agent of Chillicothe, Ohio, suffered for nearly three years with dyspepsia in its worst forms, having periodical spells of vertigo, fainting and chills. He wrote over his own signature: "I spent about \$500, had the best medical attendance, tried all the remedies recommended without success, until I was induced to try Warner's safe cure. I used three bottles, have gained twenty pounds and feel like a new man."

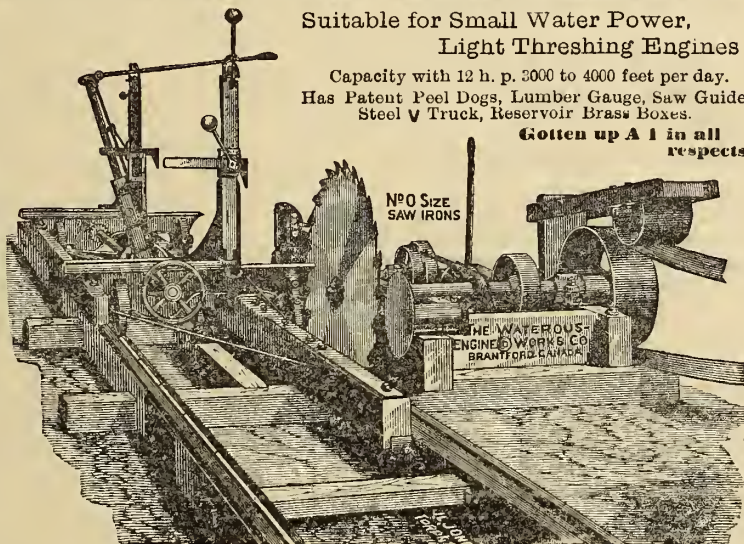
Such a man as we have described, nine times out of ten, unconsciously to himself or to his physician, has a kidney disorder, which is fast wasting his body and life. He sees the merits of Warner's safe cure at every turn, and hears it proclaimed from the housetops, and yet he does not use it, because it is said by his illiberal physician that it is not professional, and not admitted by the code. Meanwhile the man of the world presses forward, cares not a fig for this or that school; his aim in life is success and he looks hopefully forward to the world beyond, believing and trusting in man in this world, and to his faith for the world beyond.

*Detroit Free Press.
†Chicago Mining Review.

†Trans. Am. Ins. M. E.
§Stahl und Eisen Vol. vii pp. 87-93.

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1st.—Lot 28, in the 6th range, containing 100 acres, in addition to the salina of the lake.

2nd.—North half of lot 23, in the 5th range, containing 100 acres.

3rd.—Nine acres of lot No. 28, in the 5th range, with water privileges thereto appertaining, being site of mill dam, etc., etc.

The property formerly belonged to the Montreal Plumbago Mining Company, and was worked successfully for several years, until the company's mill was destroyed by fire, but the mill dam remains almost uninjured, and there are on the property several houses, sheds, etc., built for various purposes when mining operations were carried out.

The Plumbago Deposits

upon the property are regarded as amongst the richest and most extensive in the Dominion. As to the quality of the Plumbago, it has been extensively used in the manufacture of crucibles, lubricating leads, stove polish, etc., etc., and given unbounded satisfaction. This is established by the experience of consumers, and by a certificate from the celebrated Battersea Crucible Works, London, England, a copy of which is open for inspection.

MICA

has also been discovered in quantities.

The lands are in the Phosphate region, and recent prospecting has disclosed a rich and extensive deposit of this mineral. There are unrivalled facilities for transporting the ore to and from the mines by the Ottawa River and C. P. Railway. Distance from mines to Railway Station 6 miles. Good road.

All that is required to make these valuable mines handsomely remunerative is a little capital and enterprise.

The Title is Indisputable.

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TOWNSHIP OF ASCOT.

- 1st. Clark Mine, Lot 11, R. 7 Ascot 187 acres
- 2nd. Sherbrooke Mine, part Lots 12 and 13, R. 7 Township of Ascot..... 329 "
- 3rd. Belvidere Mine, part Lots 9 and 10, R. 9 and 10, R. 8 Ascot 292 "
- 4th. Mining Rights in same vicinity on..... 250 "

All of the above properties lie within 1½ miles of the Village of Lennoxville, at the junction of the Grand Trunk, Canadian Pacific and Passumpsic Railways, and have been developed to a considerable extent, and veins opened 6 to 20 feet in width, yielding 3 to 5 per cent. of copper, also silver, and 35 to 40 per cent. of sulphur. These mines are only 2½ to 3 miles distant from the City of Sherbrooke, and evidently are of the same class of ores found at Copelton, only four miles distant, owned and worked by the Orford Copper and Sulphur Company, and by Messrs. G. H. Nichols & Co., of New York, which have proved so remunerative.

TOWNSHIP OF ORFORD.

5th. Carbuncle Hill Mine, Lots 2 and 3 R. 14, and 2, 3, 4 R. 15, 718 acres. Same class of ore as is found in the Ascot properties above described, but yielding a higher percentage of copper.

TOWNSHIP OF CLEVELAND.

6th. St. Francis Mine, ¼ Lot 25 R. 12, 50 acres, with dwelling houses, smith's shop, ore sheds and office, large winding and pumping steam engine, with boiler, winding and pumping gear, and about forty fathoms Cornish lifting pumps complete, railway tracks, ladders, etc., situated three miles from Grand Trunk Railway. A considerable amount of mining work has been done at this mine. A well defined vein richly charged with vitreous purple and yellow sulphurets of copper traverse the entire length of the property, five feet in thickness, yielding 8 to 40 per cent. metallic copper.

TOWNSHIP OF GARTHBY.

7th. Fifty-six lots of land, 2,938 acres. This property for the most part is unexplored, but copper is found on the greater part of the property. On one of the lots a vein about twenty feet in width has been found. Samples of the ore have yielded as much as 22 per cent. of copper, being also rich in sulphur. Other samples of pyrites from the same property, free from copper, have yielded as high as 48 per cent. of sulphur. The only drawback to this property is in its distance from the railway, it being about four miles from Garthby Station, Quebec Central Railway. A new line is chartered, however, which, when built, will run directly through the property.

TOWNSHIP OF ACTON.

8th. The Acton Mine, 100 acres, with engine, boiler, pumps and appliances. Within three years after this mine was first opened it produced nearly \$500,000 worth of copper. It is situated about half a mile distant from the stations of the Grand Trunk and South Eastern Railways.

9th. Brome Mine, part Lots 2 and 3 R. 4, 50 acres.

10th. Bolton Mine, two miles from Eastman Station, Waterloo & Magog Railway, 400 acres.

The above properties formerly belonged to the Canadian Copper and Sulphur Company, and were acquired by the present owner at sheriff's sale, giving an indisputable title thereto.

The whole or any portion of the property will be sold at reasonable prices.

For further information apply to

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Mining Regulations

TO GOVERN THE DISPOSAL OF

Mineral Lands other than Coal Lands,

1886.

THESE REGULATIONS shall be applicable to all Dominion Lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, iron or other mineral deposits of economic value, with the exception of coal.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein, either by surface or subterranean prospecting for mineral deposits, with a view to obtaining under the Regulations a mining location for the same but no mining location or mining claim shall be granted until the discovery of the vein, lode or deposit of mineral or metal within the limits of the location or claim.

QUARTZ MINING.

A location for mining, except for iron on veins, lodes or ledges of quartz or other rock in place, shall not exceed forty acres in area. Its length shall not be more than three times its breadth and its surface boundary shall be four straight lines, the opposite sides of which shall be parallel, except where prior locations would prevent, in which case it may be of such a shape as may be approved of by the Superintendent of Mining.

Any person having discovered a mineral deposit may obtain a mining location therefor, in the manner set forth in the Regulations which provides for the character of the survey and the marks necessary to designate the location on the ground.

When the location has been marked conformably to the requirements of the Regulations, the claimant shall within sixty days thereafter, file with the local agent in the Dominion Land Office for the district in which the location is situated, a declaration or oath setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as aforesaid; and shall, along with such declaration, pay to the said agent an entry fee of FIVE DOLLARS. The agent's receipt for such fee will be the claimant's authority to enter into possession of the location applied for.

At any time before the expiration of FIVE years from the date of his obtaining the agent's receipt it shall be open to the claimant to purchase the location on filing with the local agent proof that he has expended not less than FIVE HUNDRED DOLLARS in actual mining operations on the same; but the claimant is required, before the expiration of each of the five years, to prove that he has performed not less than ONE HUNDRED DOLLARS' worth of labor during the year in the actual development of his claim, and at the same time obtain a renewal of his location receipt, for which he is required to pay a fee of FIVE DOLLARS.

The price to be paid for a mining location shall be at the rate of FIVE DOLLARS PER ACRE, cash, and the sum of FIFTY DOLLARS extra for the survey of the same.

No more than one mining location shall be granted to any individual claimant upon the same lode or vein.

IRON.

The Minister of the Interior may grant a location for the mining of iron, not exceeding 160 acres in area which shall be bounded by north and south and east and west lines astronomically, and its breadth shall equal its length. Provided that should any person making an application purporting to be for the purpose of

mining iron thus obtain, whether in good faith or fraudulently, possession of a valuable mineral deposit other than iron, his right in such deposit shall be restricted to the area prescribed by the Regulations for other minerals, and the rest of the location shall revert to the Crown for such disposition as the Minister may direct.

The regulations also provide for the manner in which land may be acquired for milling purposes, reduction works or other works incidental to mining operations.

Locations taken up prior to this date may, until the 1st of August, 1886, be re-marked and re-entered in conformity with the Regulations without payment of new fees, in cases where no existing interests would thereby be prejudicially affected.

PLACER MINING.

The Regulations laid down in respect to quartz mining shall be applicable to placer mining as far as they relate to entries, entry fees, assignments, marking of localities, agents' receipts, and generally where they can be applied.

The nature and size of placer mining claims are provided for in the Regulations, including bar, dry, bench creek or hill diggings, and the RIGHTS AND DUTIES OF MINERS are fully set forth.

The Regulations apply also to

BED-ROCK FLUMES, DRAINAGE OF MINES AND DITCHES.

The GENERAL PROVISIONS of the Regulations include the interpretation of expressions used therein; how disputes shall be heard and adjudicated upon; under what circumstances miners shall be entitled to absent themselves from their locations or diggings, etc., etc.

THE SCHEDULE OF MINING REGULATIONS

Contains the forms to be observed in the drawing up of all documents such as:— "Application and affidavit of discoverer of quartz mine." "Receipt for fee paid by applicant for mining location." "Receipt for fee on extension of time for purchase of a mining location." "Patent of a mining location." "Certificate of the assignment of a mining location." "Application for grant for placer mining and affidavit of applicant." "Grant for placer mining." "Certificate of the assignment of a placer mining claim." "Grant to a bed rock flume company." "Grant for drainage." "Grant of right to divert water and construct ditches."

Since the publication, in 1884, of the Mining Regulations to govern the disposal of Dominion Mineral Lands the same have been carefully and thoroughly revised with a view to ensure ample protection to the public interests, and at the same time to encourage the prospector and miner in order that the mineral resources may be made valuable by development.

COPIES OF THE REGULATIONS MAY BE OBTAINED UPON APPLICATION TO THE DEPARTMENT OF THE INTERIOR.

A. M. BURGESS,

Deputy Minister of the Interior.



Notice to Contractors.

SEALED TENDERS addressed to the undersigned and endorsed "Tender for Post Office at Coaticook, P.Q.," will be received at this office until Thursday, 29th December, for the several works required in the erection of Post Office, at Coaticook, P.Q.

Specifications can be seen at the Department of Public Works, Ottawa, and at the office of the Collector of Customs, Coaticook, on and after Tuesday, 13th December, and tenders will not be considered unless made on form supplied and signed with actual signatures of tenderers.

An accepted bank cheque payable to the order of the Minister of Public Works, equal to five per cent. of amount of tender, must accompany each tender. This cheque will be forfeited if the party decline the contract or fail to complete the work

contracted for, and will be returned in case of non-acceptance of tender.

The Department does not bind itself to accept the lowest or any tender.

By order,

A. GOBEIL,

Secretary.

Department of Public Works,
Ottawa, 5th December, 1887.



Notice to Contractors

SEALED TENDERS addressed to the undersigned and endorsed "Tender for Post Office at Napanee, Ont.," will be received at this office until Tuesday, 10th January, for the several works required in the erection of Post Office, at Napanee, Ont.

Specifications can be seen at the Department of Public Works, Ottawa, and at the office of F.

Bartlett, Esq., Architect, Napanee, on and after Tuesday, 20th December, and tenders will not be considered unless made on form supplied and signed with actual signatures of tenderers.

An accepted bank cheque payable to the order of the Minister of Public Works, equal to five per cent. of amount of tender, must accompany each tender. This cheque will be forfeited if the party decline the contract or fail to complete the work contracted for, and will be returned in case of non-acceptance of tender.

The Department does not bind itself to accept the lowest or any tender.

By order,

A. GOBEIL,

Secretary.

Department of Public Works,
Ottawa, 19th Dec., 1887.

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Notice to Contractors.

Change of Time.

THE time for receiving tenders for the construction of

A POST OFFICE

ST. JEROME, P.Q.

is hereby extended to FRIDAY, the 30th day of December.

By order,

A. GOBEIL,

Secretary.

Department of Public Works,
Ottawa, 12th Dec., 1887.

A. R. WILLIAMS,

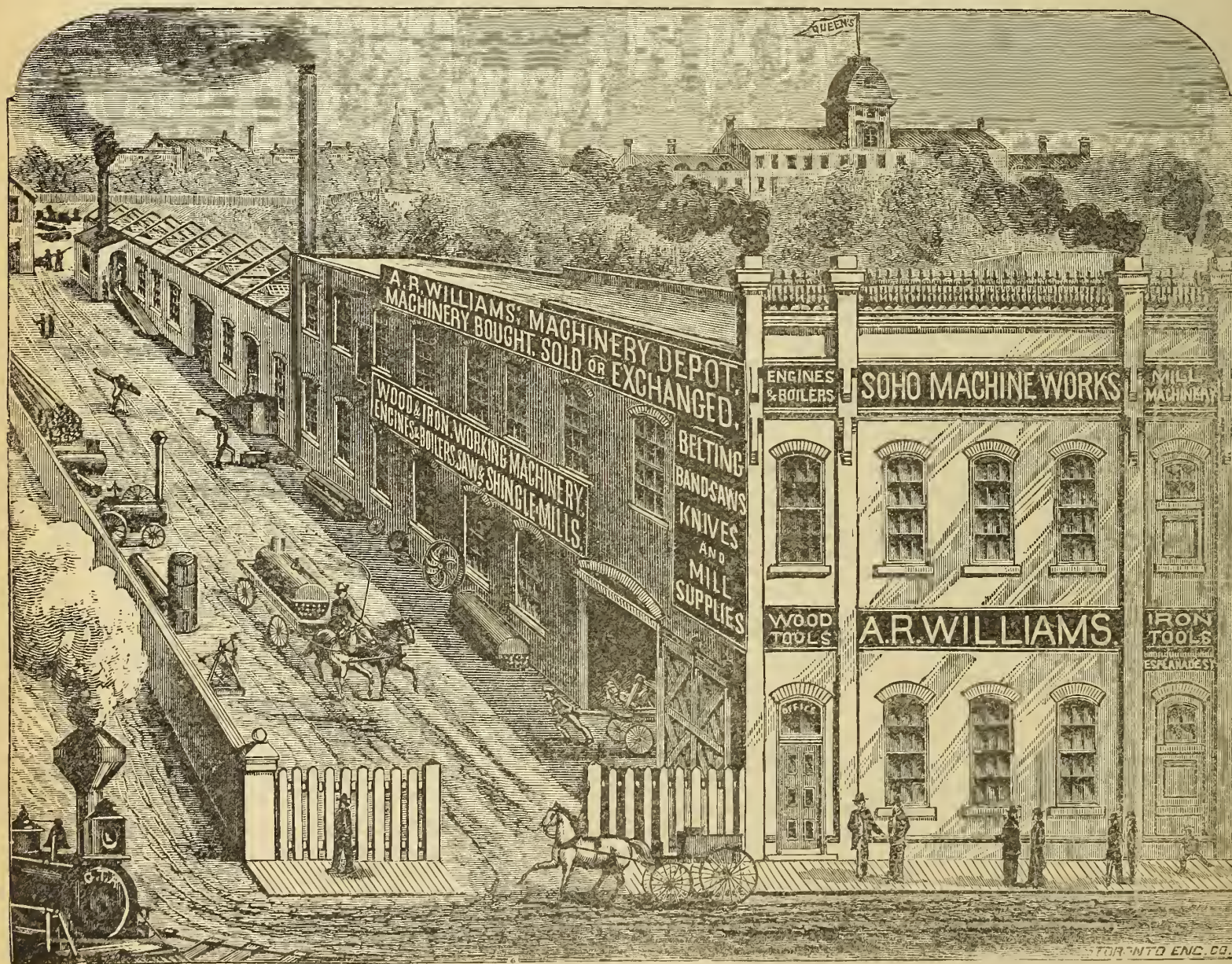
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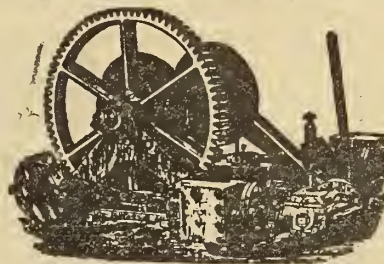
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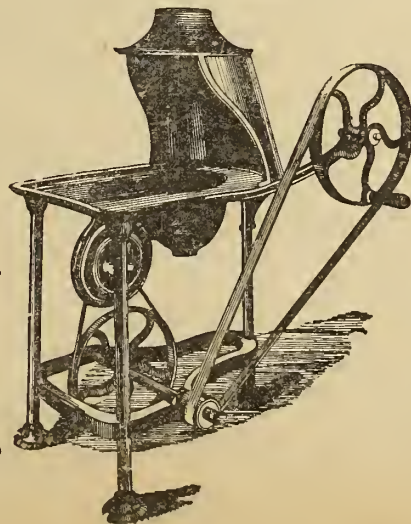
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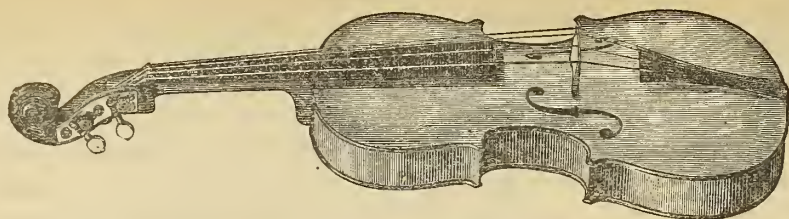
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NOTICE RESPECTING PASSPORTS.

PERSONS requiring passports from the Canadian Government should make application to this Department for the same, such application to be accompanied by the sum of four dollars, in payment of the official fee upon passports as fixed by the Governor-in-Council.

G. POWELL,
Under Secretary of State.
OTTAWA, 19th Feb., 1886.



Department of Inland Revenue.—An Act respecting Agricultural Fertilizers.

The public is hereby notified that the provisions of the Act respecting AGRICULTURAL FERTILIZERS came into force on the 1st of January, 1886 and that all Fertilizers sold thereafter require to be sold subject to the conditions and restrictions therein contained—the main features of which are as follows:

The expression "fertilizer" means and includes all fertilizers which are sold at more than TEN DOLLARS per ton, and which contains ammonia, or its equivalent of nitrogen, or phosphoric acid.

Every manufacturer or importer of fertilizers for sale, shall, in the course of the month of January in each year, and before offering the same fertilizer for sale, transmit to the Minister of Inland Revenue, carriage paid, a sealed glass jar, containing at least two pounds of the fertilizer manufactured or imported by him, with the certificate of analysis of the same, together with an affidavit setting forth that each jar contains a fair average sample of the fertilizer manufactured or imported by him; and such sample shall be preserved by the Minister of Inland Revenue for the purpose of comparison with any sample of fertilizer which is obtained in the course of the twelve months then next ensuing from such manufacturer or importer, or collected under the provisions of the Adulteration Act, or is transmitted to the chief analyst for analysis.

If the fertilizer is put up in packages, every such package intended for sale or distribution within Canada shall have the manufacturer's certificate of analysis placed upon or securely attached to each package by the manufacturer; if the fertilizer is in bags, it shall be distinctly stamped or printed upon each bag; if it is in barrels, it shall be either branded, stamped or printed upon the head of each barrel or distinctly printed upon good paper and securely pasted upon the head of each barrel, or upon a tag securely attached to the head of each barrel; if it is in bulk, the manufacturer's certificate shall be produced and a copy given to each purchaser.

No fertilizer shall be sold or offered or exposed for sale unless a certificate of analysis and sample of the same shall

have been transmitted to the Minister of Inland Revenue and the provisions of the foregoing sub-section have been complied with.

Every person who sells or offers or exposes for sale any fertilizer, in respect of which the provisions of this Act have not been complied with—or who permits a certificate of analysis to be attached to any package, bag or barrel of such fertilizer, or to be produced to the inspector, to accompany the bill of inspection of such inspector, stating that the fertilizer contains a larger percentage of the constituents mentioned in sub-section No. 11 of the Act than is contained therein—or who sells, offers or exposes for sale any fertilizer purporting to have been inspected, and which does not contain the percentage of constituents mentioned in the next preceding section—or who sells or offers or exposes for sale any fertilizer which does not contain the percentage of constituents mentioned in the manufacturer's certificate accompanying the same, shall be liable in each case to a penalty not exceeding fifty dollars for the first offence, and for each subsequent offence to a penalty not exceeding one hundred dollars. Provided always that deficiency of one per centum of the ammonia, or its equivalent of nitrogen, or of the phosphoric acid, claimed to be contained, shall not be considered as evidence of fraudulent intent.

The Act passed in the forty-seventh year of Her Majesty's reign, chaptered thirty-seven and entitled, "An Act to prevent fraud in the manufacture and sale of agricultural fertilizers," is by this Act repealed, except in regard to any offence committed against it or any prosecution or other act commenced and not concluded or completed, and any payment of money due in respect of any provision thereof.

A copy of the Act may be obtained upon application to the Department of Inland Revenue, as well as a copy of a Bulletin which it is proposed to issue in April, 1888, concerning the fertilizers

E. MIALI,

15th Dec., 1887.

Commissioner.

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In Eastern Ontario, and principally within the belts containing

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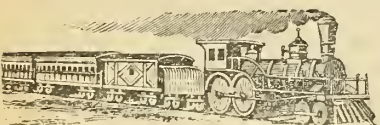
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OTTAWA.

The REVIEW is published purely in the interests of the Canadian Mining Industry, and its publishers will be thankful for any encouragement they may receive from those interested in its speedy development.

Visitors from the mining districts, as well as others interested in Canadian Mineral Lands, are cordially invited to call at our office.

Mining news and reports of new discoveries of mineral deposits are solicited.

All matter for publication in the REVIEW should be received at the offices not later than the 19th of the month.

Address all correspondence, &c., to the Manager of THE CANADIAN MINING REVIEW, Ottawa.

And now, before proceeding with our sixth vol-

The present number has been enlarged to twenty pages, and as indicated in a former issue, the REVIEW will now be paged continuously and indexed for such of our subscribers as may wish to bind them together for reference.

It is to be regretted that the exports and imports given by the latter do not correspond with the calendar year, since, as the figures now stand, they are apt to be misleading. The movement, however, is an excellent one, and as the work bears the impress of the Government, it can be taken as accurate, and its correctness as vouched for by Dr. Selwyn himself. From this table we learn that the total value of the Products of the Mine for 1886 amounted to \$10,529,361, of which \$3,830,821 worth were exported, thus realizing for Canada that amount of foreign capital.

It is a mystery why our Plumbago or Graphite deposits, which have been acknowledged to be next, if not even equal, to those of Ceylon, are not worked. It is not so long ago since the hum of the Graphite industry was heard in this vicinity, and the Plumbago exhibits at the various World's Fairs, sent from the Ottawa district, have always carried off high prizes, and evoked great admiration; but the fact remains, the mines are at a standstill. Here is an enterprise open to capitalists.

to be made of the lignite of the Souris district in Manitoba, of which so much was said and predicted when its discovery was first announced. If this formation is of any value at all as a fuel, the settlers on the almost treeless districts around Brandon and the adjacent country would be much benefitted by such fuel being made accessible. We notice also that no mention is made of Peat or Peat deposits. Whether this formation can be classed as a mineral we do not profess to know from a geological point of view, but we fancy it would not be a very easy matter to state accurately where Peat ceases and where lignite begins. We hope the next issue of this report will include these products of the mine.

The amount of labour bestowed on the Report by Mr. Coste and his assistant, Mr. Brumell, does those gentlemen great credit, and although the tables as they appear do not look very formidable, we can assure our readers that no one who has not buried himself in statistical reports can form any idea of the vast amount of time and labour, and burning of the midnight oil that goes to make these very tables. Sheets of calculations and pages of addition are often represented in a plain table of one or two columns, occupying perhaps in their totals half a page of matter. We bespeak the thanks not only of the mining community but of business men generally for this useful and concise Report—a report which will be consulted in the United States and in Great Britain equally with Canada. An official report always carries weight, the sources from which its information is obtained being authentic, and as reliable as any such information can be. The only wonder we can express is that the Government has not called for such a report long before this. To the mining industry and to the general public it certainly is the most useful of all the reports that can emanate from the Geological Survey, being shorn as it is of the scientific parlance peculiar to the ordinary geological reports.

Ontario's Imbecile Mining Laws.

It is very gratifying to notice that other journals are now taking up the question of the backward condition of the mineral development of the province consequent upon the present unsatisfactory state of the mining laws. The *Toronto World* of the 9th inst. advocates as a necessity "A mining policy for Ontario," and continues daily to show evidence of its necessity, and other papers have followed suit with equally good cause for complaint. The total neglect of the interests of the mining community by the authorities (save and except in the instance of a few chosen parties and the district in which they operate) has been too well carried out for the benefit of the few favorites, and to the detriment of the real workers—the discoverers of minerals. As we have again and again pointed out in these columns, the present system of granting mineral

lands is nothing short of legalized fraud, and is too glaring an injustice to be allowed to remain any longer in this condition. Are the Ontario legislators blind or asleep? If not, let them read carefully the pages of *THE CANADIAN MINING REVIEW* during the past year, as well as the recent issues of the *World*, and awake to the urgent claims of the mining community for justice. Our demands are:—The *location* of a *mineral claim* by the discoverer *on the ground*, instead of the present system of having it done, or rather having it *not* done, as it is too often the case in the land office, that Mr. Speculator has a prior and unlimited application for a whole district. *Free grants* of mining claims *to miners*, and *compulsory development* of these claims, under just and proper regulations for the manner of working. Surface lines as boundaries of mining claims are not the just mineral boundaries. A miner should follow the dip of the lode, vein or bed of ore, as surface lines or boundaries are not those in the interest of development, or protection of capital or labor invested. Auction sales of mining lands are in the interests of speculators only, and ought to be discontinued. *Competent mine inspection*, and *complete provincial mining statistics*, and *trustworthy mineral reports*, and not political advertisements, as at present, by "special agents" of questionable standing. Equal educational advantages to mining and agricultural students, or none, to anyone.

Iron and Steel Institute.

We have to acknowledge this month the second volume of the Journal of the Iron and Steel Institute for 1887. Among the many interesting features of its extensive and well edited pages we need only select the titles of a few of the principal papers in order to show its scope: "On the Metallurgical and Mechanical Exhibits at the Manchester Royal Jubilee Exhibition," by Mr. Thomas Ashbury; "On the Reduction of Ores of Iron in the Blast Furnace," by Sir Lowthian Bell, Bart., F.R.S.; "Notes on the Basic Open-Hearth Process," by Mr. J. W. Wailes; "On Electric Lighting in Works and Factories," by Professor J. A. Fleming M.A. An old pamphlet published in London by the iron manufacturers of Great Britain as far back as 1756, and entitled "The Case of the Importation of Bar Iron from our own Colonies of North America," is also reproduced, and will be read with peculiar interest by the iron manufacturers of the Dominion.

Raw Phosphates.

Previous to the year 1770 it is difficult to find any record of the use of bones for agricultural purposes. In 1740 their value for a top-dressing for grass lands was accidentally discovered at Sheffield, where a heap of bone shavings, scrapings, &c., was buried in a field with marvellous results.

The mechanical division of bones in their

raw state was difficult and so costly that it precluded their use in any other form than crushed.

Liebig, some fifty years ago, found that by the application of sulphuric acid to bones it reduced them to a finer state of division than could be done by then known mechanical means.

This application is often called dissolving bone in acid. There is no clear solution.

It is a mere breaking up, it is a softening, pap-forming process, and bone in this state, would more appropriately be called bone pap.

The bone is merely so far reduced that, when rubbed between the thumb and finger, no grit is felt. Bone cannot all dissolve, for the sulphuric acid, when added rightly, unites with the lime of carbonate and phosphate, and forms with that insoluble sulphate of lime or plaster.

It is this which gives the grayish white look to the bone porridge.

At the present time comparatively few bones are used for fertilizing purposes; phosphate rock, phosphorite, apatite and coprolites having been substituted generally in place of bones in manufactured superphosphates and commercial fertilizers. Where originally it was impossible to get raw bones ground fine by machinery that difficulty does not exist with phosphate rock, phosphorite, apatite and coprolites, as they are all easily reduced to an impalpable powder at a low cost with the present machinery now in use, and it has been found by repeated experiments by competent authorities that if the phosphates are ground to an impalpable powder, they are as available to crops as if they had been treated with sulphuric acid, the carbonic acid of the soil and the soil water being as efficient a solvent as the sulphuric acid.

In saying that phosphoric acid is insoluble it is meant that it is insoluble in pure or distilled water. Water which contains carbonic acid, ammonia or common salt (and all water contains one or more of these) has the power of liberating the phosphoric acid from its base lime and rendering it available to roots. The action is slow, but it is sufficient, and it is more rapid the finer the pulverization of the phosphate.

In fact phosphates treated with sulphuric acid to render them soluble before, but not after they are applied to the soil and sold under the name of superphosphate, when applied to the soil reverts or goes back to its original condition; this is generally admitted, but it is soluble in the acids of the soil in the same manner as are the phosphates ground to an impalpable powder. It is estimated that 400,000 tons of sulphuric acid, 50° strength, are used annually in the United States to convert insoluble phosphoric acid into soluble phosphoric acid, and that this quantity will be doubled during the next five years.

As it requires about a ton of sulphuric acid of this strength for every ton of phosphate rock containing sixty per cent. of phosphate of lime, it is readily seen that the sulphuric acid will cost more than the phosphate of lime, and reducing the quantity of phosphoric acid in the resulting superphosphate one-half.

Certainly this is a most costly way for the farmer to obtain the phosphate of lime, finely divided so that the acids of the soil can act upon it. The present machinery in use is by far the cheapest method, for in addition to the great cost of the sulphuric acid and the necessary expenses attending its use, there comes the expenses of transportation which has been doubled by the addition of the sulphuric acid. It is claimed by some that for tilled and quick growing crops, (it is conceded that it will for grass and winter grains) the phosphoric acid will not be liberated as fast as the crops require it from the phosphate when in an impalpable powder; but there can be applied at the same cost, four times the quantity of phosphoric acid in phosphate of lime in an impalpable powder, than there can be in phosphate of lime treated with sulphuric acid, and there can be no question but that with using four times the quantity as much phosphoric acid, if not more, will be as available for the growing crop as if one-quarter part was used that had been treated with sulphuric acid; again the additional three quarters used is not lost, but becomes assimilated in the soil for the drafts of future crops upon it.

But we are not confined to the use of sulphuric acid or the slower operations of nature to render the phosphoric acid in phosphate of lime immediately available for crops. It has long been known that fermenting manure or peat with phosphate of lime powder scattered or mixed through it, would render the phosphoric acid at once available.

This certainly is a better as well as a cheaper way for the farmer to procure soluble phosphoric acid, than to get it in phosphate of lime, treated with sulphuric acid at four times its first cost and the expenses for transportation doubled.

The theory of scientific agriculture is based upon a complete knowledge of soils, plants, animals and manures, and it is evident that until these elements are thoroughly understood, no attempts at improvement or plans for increased production can possibly be successful. The manure question is the most important one connected with agriculture or horticulture. With fine ground phosphates as the basis of operations, we can now obtain complete manures for any culture, made according to any formula and containing in a readily assimilable form all the ingredients called for.

A. H. W.

The subscription price for THE CANADIAN MINING REVIEW is \$1.50.

A Visit to Ohlendorff's Chemical Works.

Frank D. Adams, M.Ap., Sc., Geological Survey, Ottawa.

While in London in 1886 in connection with the Colonial & Indian Exhibition, an invitation was extended to a number of gentlemen from the various British Possessions represented at South Kensington, by the Manager of the Anglo-Continental (late Ohlendorff's) Guano Works to visit and inspect the company's well known establishment. As the subject of phosphate manures is one of special interest to Canadians, and this company do about the largest business, as manure manufacturers and guano merchants, in the world, a few notes on our visit may perhaps prove of interest to your readers.

Meeting at St. George's docks early in the morning our party embarked in the company's smart little steamer, which we found gaily decorated with flags awaiting our arrival, and started down the Thames, under the various bridges, past the tower and then by the interminable wilderness of warehouses and manufacturing factories lining the banks of the river, till we reached the Tidal Basin, where the company's works are situated. On landing we were cordially welcomed by the manager, who, in a short speech, gave us a few general facts concerning the works. The London factory, we learned (for the firm owns three others situated at Hamburg, Antwerp and Emmerich-on-Rhine respectively), covers no less than eight acres of ground and turns out weekly over 1,000 tons of manufactured manures, giving regular employment to about 300 men in addition to a number of women. Being situated on the bank of the Thames with convenient wharves, steam cranes, &c., it has great facilities for loading and discharging vessels, and a siding of the Great Eastern Railway connects the factory with the various railway systems of the United Kingdom. This factory, together with the other three above mentioned, were taken over in 1883 by the Anglo-Continental (late Ohlendorff's) Guano Works with a paid up capital of £800,000.

The stores and warehouses, which were first visited, are lofty buildings with the floor space laid off in regular streets walled on either side to a height of 30 feet by continuous piles of bags of raw guano. At the time of our visit, we were informed, there were about 10,000 tons of this guano in stock, and when we looked at the immense number of bags, each of which was, roughly speaking, worth about £1, or \$5.00, some general idea could be obtained of the immense money value represented by this stock, which, together with the value of the other goods here stored, frequently exceeds £200,000. Although the day was only a moderately warm one the odour of ammonia exhaled from the guano was distinctly perceptible, but I was informed that in hot weather it was quite strong.

We then went on to the factory where super-

phosphate was being manufactured from South Carolina rock. The crude phosphate was first cracked, then ground in roller mills and then sifted by means of a blowing machine. The fine powder was then placed in a rather shallow circular decomposing chamber constructed of masonry and provided with a rotating stirrer, the chamber was closed and the necessary amount of oil of vitriol run in from above. The chamber was then connected with a Root's Blower and the stirrer set in motion. When the re-action was finished the mass of semi-liquid superphosphate was allowed to run through holes in the bottom of the chamber into a closed bin below, in which it cooled. When raw Peruvian guano is used, it is first pulverized in a Carr's disintegrator and sifted to free it from stones before treating it with the sulphuric acid.

In smaller storehouses, adjacent to the factory, were various other crude phosphates which the company employed or were experimenting upon. Among them were bones, Belgian phosphate, Guadeloup phosphate, Australian phosphate and Basic Bessemer Slag. I enquired from my guide, who was one of the gentlemen connected with the works, whether Canadian phosphate was employed, and he replied that some of it had been used, but that it was not liked for three reasons: 1st, on account of its greater hardness it was more difficult to grind than other crude phosphates; 2nd, being less easily decomposed by sulphuric acid it was found difficult to render the whole of it soluble; 3rd, on account of the quantity of fluorine given off on treatment with the sulphuric acid. He acknowledged that the first two difficulties might be overcome, to a certain extent at least, by more powerful machinery and finer grinding, and the third objection did not seem to be a very vital one, seeing that the South Carolina phosphate, which they were using at the time, contained some 2 per cent. of fluorine, which was set free on treatment of the rock with sulphuric acid and carried off by means of a blower. If a blower is used at any rate the presence of a few per cent. more of fluorine did not seem to be a matter of much importance. These objections do, however, still tell decidedly against Canadian phosphate as shown by the fact that at that time Sombbrero phosphate, of 70 per cent., would in England, bring as high a price as Canadian phosphate of 80 per cent., and the former does not contain a trace of ammonia.

The Basic Bessemer Slag above mentioned, although by no means very rich in phosphoric acid, is nevertheless so cheap, and contains this acid in such a soluble form, that it will undoubtedly meet with a rapidly extending use. In the year 1886 rather over 400,000 tons of it were produced, containing, on an average, from 17 to 20 per cent. of phosphoric acid, and as Mr. Gilchrist, one of the inventors of the basic (Thomas & Gilchrist) process, remarked to me in course of conversation, the iron master who produces

it can give it away and make sixpence a ton on it, as it is a bye product in the manufacture of his steel, and it costs him that amount to cart it away. As a cheap source of phosphoric acid, it, therefore, leaves but little to be desired, and its production must be regarded as one of the triumphs of modern times, seeing that great deposits of iron ore which, previously, on account of a high content of phosphorus, could not be worked into steel, are now profitably employed for that purpose, and the deleterious element phosphorus removed in it is not wasted, but rendered available for enriching the soil. The phosphoric acid, furthermore, exists in such a state that the slag does not require to be treated with sulphuric acid, as in the case of most crude phosphates, but can be applied directly to the soil. In the report of the Connecticut Agricultural Experiment Station for 1886, the director, Dr. S. W. Johnson, speaking of this slag as a manure, says: "During the last year it has been introduced into this country. The following analysis has been made on a sample from one bag sent to the station:—

Phosphoric acid, soluble in Ammonium Citrate..... 19.59 per cent.
Phosphoric acid, insoluble in Ammonium Citrate..... .30 "

"The slag was a fine meal, which passed a $\frac{1}{50}$ inch sieve. It is sold bagged in New York for \$12.50 per ton. The phosphoric acid which it contains costs, therefore, about $3\frac{1}{2}$ cents per pound." The same phosphoric acid in ordinary phosphates was at that time selling for $7\frac{1}{2}$ cents per pound.

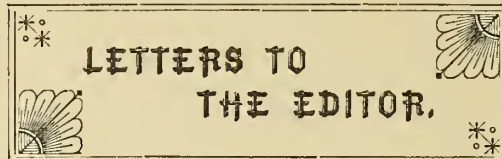
Our party then visited the sulphuric acid works, which had, unfortunately, a short time before, been partially destroyed by fire. Workmen were engaged in soldering, or, rather, melting, together, by means of oxyhydrogen blowpipes, the lead plates for the construction of the acid chambers, the joints produced being extremely neat. Spanish pyrites supplies the sulphur required by the works.

After visiting a small museum, in which were exhibited samples of the various crude materials and manufactured products of the factory, as well as many curious remains of birds, some of them still showing the feathers, which are occasionally found in the guano, we returned to the wharf, passing through another portion of the great warehouse where the manufactured manures are stored in bulk, in hills or small mountains, often containing thousands of tons. Cards showed the amount of phosphoric acid contained in each of the brands, the richest which I saw being a small heap of superphosphate manufactured from Canadian apatite.

In addition to the regular phosphatic manures, such as superphosphate, dissolved guano, dissolved bones, etc., most of which also hold ammonia, the firm manufactures a number of special manures, such as "grain manure," "flax manure," "tobacco manure" and "cane manure," a large amount of the last mentioned being ex-

ported to the West Indies; and also deals in raw fertilizers, such as nitrate of soda, kainit, bone dust, etc. The various manures for exportation are carefully weighed, bagged and the bags sealed. Every bag is accompanied by a guaranteed analysis, the large scale on which the manufacture is carried on, and the testing of the manure by chemical analysis, from time to time during the process of manufacture, leading to a great uniformity in the finished product.

Having thanked the various gentlemen connected with the works for their very kind invitation and our most enjoyable visit, we embarked in our little steamer and returned to London the same evening.



We invite Correspondence upon matters consistent with the character of the REVIEW.

Be as brief as possible. The writers name in all cases required as a proof of good faith.

One dozen copies of the issue containing his communication will be mailed free to any correspondent on request.

We do not hold ourselves in any way responsible for the opinions expressed in this section of the REVIEW.

Chromic Iron.

QUEBEC, 11th Jan., 1888.

The Editor

THE CANADIAN MINING REVIEW:

SIR,—Will you give me a few lines in your interesting journal to direct the attention of chemists, capitalists and investors to the question of establishing works for the manufacture of Bi-Chromate of Potash in the eastern townships. Chromic Iron is, as many of your readers are well aware, found in considerable quantities in this district, notably in South Ham, Lake Nicolet, Leeds, Thetford, Wolfestown and other points within the great serpentine belt in the Province of Quebec, and assays of the ore have given as much as 60.0 of chromic acid. In the United States the Tyson Company, of Baltimore, the Kailon Chemical Company, of Philadelphia, and other large manufacturing establishments are purchasing Canadian ore at \$18 per ton, paying duty and freight and returning the manufactured product for sale in the Dominion. There is also a very large annual consumption in Great Britain and Europe. Does it not seem reasonable to suppose that the manufacture of Bi-Chromate of Potash in our own country would pay? The late Sir William Logan evidently thought so when he wrote (Geology of Canada, 1863, p. 150):—

"The process of manufacturing the Bi-Chromate of Potash is one which might be very well carried on in this country. It consists simply in calcining the finely ground ore with Crude Potash, in a proper furnace, exposed to a certain current of air, by which the chromic oxyd. is acidified, and unities with the potash. The resulting mass is lixiviated with water, and the solution, being mixed with a certain amount of sulphuric acid furnishes by evaporation crystallised Bi-Chromate of Potash. In the absence of sulphuric acid, a crude neutral Chromate of Potash might readily be prepared by simple evaporation and shipped to England to be there converted into Bi-Chromate."

The facilities for obtaining quantities of Potash from the woods, the cheapness and facility with which the ore and requisite fuel may be obtained, the immediate vicinity of

railway transportation, are such as to offer much encouragement for the working of chrome ores in the eastern townships.

I am, etc.,

R. J. R.

[When Mr. Thomas Macfarlane, F.R.S., first suggested in his Report to the late Sir William Logan, in 1863, the advisability of establishing such manufactures in this section of the country there was a strong monopoly in the English and Scotch markets, and prices ranging from £11 10s. to £12 could then be obtained for the ore. At the present time competition on the European market is keen, and prices comparatively low. It is true that as high as 60% has been obtained from Canadian ore, but this average would be more properly stated as a little more than 40%—too low to compete in Europe with the mineral from Russia and Siberia which goes as high as 70%. Three samples of Canadian Chromic Iron, taken, we believe, from the Province of Quebec, were tested at the Colonial Exhibition held in London two years ago with results ranging from 43.25 to 49.4%, and it was learned from a Glasgow firm doing a large business in the mineral that manufacturers there did not care to purchase any containing less than from 50 to 52% of Chromic acid. Ore of that percentage was worth about £4 per ton delivered in Glasgow. In the "Mineral Resources of the United States," published by the United States Geological Survey, the following facts concerning Chromic Iron are given:—Production in United States 1884 2,000 long tons, value \$35,000; 1885 2,700 long tons, value \$40,000. Price varies according to cost of transportation to a manufacturing centre. In San Francisco it is worth about \$15 a long ton, subject to all the fluctuations of the imported ores from Russia and Turkey. In 1885 the price delivered at Baltimore or Philadelphia was \$26. The price of Potassium bichromate fell from 10½ cents in 1884 to 9½ cents per pound in 1885. In 1885 2,500 short tons of Potassium and sodium bichromates were made in the U.S.A. A large amount of Chromic Iron was imported from Russia and Asia mines.]—EDITOR.

Will Coal be Found in Ontario?

Westville, N. S.

The Editor

THE CANADIAN MINING REVIEW:

SIR,—The question whether coal will be found in Ontario, or, rather, in the upper provinces, I may more correctly put it, is one of such vast importance to the Dominion that it demands more consideration than it apparently gets at the present time. From observations I was enabled to make, during a brief sojourn in Ottawa, after my arrival in this country from England, I was led to believe that coal will sooner or later be found within 100 miles of that city, and that belief was shared by a man who has for a great number of years been employed boring for Coal and other minerals in England and Scotland. I will not at the present time go into any particulars as to what gave rise to that belief, but will be pleased to communicate more fully with any capitalist who may be interested in the subject (my name and address may be had at the office of this paper). I must confess I felt somewhat disappointed at hearing what opinion some eminent geologists are reported to have expressed on the Rock Formation of Ontario; disappointed because if suc-

reported expression of opinion has actually been made it will, I fear, have an injurious effect inasmuch that it will have a tendency to deter capitalists from investing the capital necessary to put down deep borings (the only means by which coal is likely to be found). I hope other and more able pens than mine will now take it up.

I will here put a few questions which I trust some of our geologists will kindly note and answer.

1st. Has the knowledge of the formation of Ontario and Quebec as gained by geological surveys, &c., being such as would justify geologists in advising against boring for coal?

2nd. What reason is there for supposing that Coal will not be found in Ontario, where the Strata is the same as overlies and underlies coal in other parts of Canada and, to my own knowledge, at over fifty collieries in England?

3rd. What is Natural Gas and what is its origin?

This last question is brought out by the fact that several discoveries of Natural Gas have recently been made in Canada, and I am informed that in Pictou County, Nova Scotia, holes were frequently made with sticks, etc., in the soft ground near the banks of the East River, and Natural Gas would arise therefrom which would burn freely. Is there any reason to think that the gas as given off there would be different from that found in other parts of Canada, or that it would have a different origin?

I am, yours respectfully,

BRITON.

An American View of our Mining Laws.

Ottawa, 20th. Jan. 1888.

The Editor

THE CANADIAN MINING REVIEW.

SIR,—Allow me a small space in your valuable journal to compare your Mining Laws with those of the United States, under whose laws I have been mining for some time past, and to endeavour to demonstrate the impracticability of developing your mining industries where such laws exist.

It is a well conceded fact, patent to every fair minded person, that the development of a country, the prosperity of a country, its industries, its wealth, must originate in its mines, its lumber and its fisheries. California, and indeed the whole of the Pacific Coast, owes her prosperity to her mines and to the indomitable will and energy of her miners, who risked their lives and their health, their all, in developing the mineral wealth of the country and the Pacific Coast in general.

In the first place the Government of the United States reserve the right to all her mineral lands, coal included; and mineral lands cannot be purchased except under conditions herein after mentioned, giving to the discoverer the first Right of Patent, thus preventing parties from purchasing mineral lands for the purpose of speculation.

Sections 2324-2325 of the revised Mining Laws of the United States say, that any bona-fide miner can locate 1500 feet upon any location (not already located), and after recording the same can, upon showing the actual outlay of \$1,000 upon such location, obtain a United States Patent for it—or the miner need but spend an outlay of \$100 per year to hold such location, and at any time in the future may obtain his Patent upon the proper

showing. Now, I find in your mining regulations that a claimant must file his declaration and obtain a receipt and pay \$5.00 which receipt only holds good for the period of one year, and must be renewed every year, which, in fact, is in reality a licence in every acceptance of the term, and which with us, in California or on the Pacific Slope, would only retard mining or prospecting, as how many poor fellows work from hand to mouth, and to compel them to put up \$5.00 per year would, indeed, be wrong. Were your Government to abolish all such fees and encourage honest mining; not by subsidizing companies, but by protecting the miners in their locations against these land sharks who obtain large concessions of land and hold it to the detriment of the good interest of the country. I, for my part, was formerly a Canadian, but have mined in Australia and New Zealand under the license system; and also in California, Nevada, Alaska and the Pacific Coast generally, under our United States system, and can only say that for prosperous mining and unhampered prospecting in my opinion, and I echo that of thousands, our laws are the most generous.

In regard to the sale of mineral lands, especially in large concessions, to parties who only hold them for speculative purposes, no one can deny that the policy of the Canadian Government must surely work a great wrong on the people and be a detriment to the development of your mining interests, which in the estimation of every thoughtful person, are among the most extensive in the world, and have caused an interest to be awakened, not only here in Canada, but in the United States, England and in Europe generally. Were it not for the foreign capital invested in the mines of the United States to-day, it is hard to say where our miners would be—what would be the condition of the Pacific Coast? To avoid capital from leaving your country and seeking the United States, it is only necessary to open up and develop your mines, and in order to do so the miners must be encouraged and protected, every inducement must be extended to them and not hampered by licenses, and such regulations that would necessarily be a drawback. Space will not permit me to enter into a *résumé* of your Mining Laws, but from careful observation I can see much to change for the better, with all due deference to your law makers. In regard to what is called the "California" or "Ledge" claims it is a well conceded fact that never was a law yet made that had not two sides to the question, nor ever a law framed that did not work a hardship to some. I do not write these lines for the purpose of provoking an argument on the merits of your laws, but to give you the views of an old miner who has prospected in California and in other parts of the Pacific Coast, and has yet to find laws that are better or more generous than those of the United States for the protection of her miners and the development and encouragement of her miners.

In the *Toronto World* of Saturday, January 14th, I find several well written articles on the mineral wealth of Canada, and I am singularly struck with the several opinions of those gentlemen, who are of the same opinion as myself, in regard to what your Government should do in development of your immense mineral resources, and can only echo one sentiment of Mr. C. M. Dobson, M.E., "why should a colony like Canada be so much in the rear of Australia and Africa?"

Yours respectfully,

WILL H. NETTLE.

The Alleged Conspiracy Case—Evidence Continued.

Isaac Tatten sworn, said: I live on Tumbo Island; know Mr. Campbell and Mr. Kennedy; got acquainted with the latter when he was watchman on the Rosenfeld, about two years ago next March; the first time I met Campbell was when he came to look at the island with Mr. Gabriel; the next time I saw him he brought Mr. Gabriel's brother up to induce me to sell my underground rights; Mr. Kennedy came up with them, they were up on business connected with this coal mine, I believe; the next time Campbell came up, he came to survey it and Kennedy came with him; they told me they had come to survey my claim off; Kennedy said Campbell was a surveyor; had no conversation with Campbell before the survey; they partly surveyed the ground, then went to Victoria and came back again; I asked Mr. Campbell where he was going to put the shaft, and he told me he did not know exactly, and he asked me if I would give him half if he put it on my land; I said I would, and after the survey was completed he told me I had better go down to Victoria with him; asked him how much he thought he could get for putting it there; he replied that he thought the company would stand about \$500; the company held a meeting in Mr. Sayward's office; Campbell did not give me any instructions what to say to the company; I came to Victoria with Mr. Campbell and Mr. Kennedy; when we got to Victoria we went to Mr. Sayward's office; the company asked me how much I wanted for sinking the shaft on my land, and I said \$500. I think I made a mistake a minute ago, I do not think Mr. Kennedy was there; Mr. Campbell, Mr. Muirhead, Mr. Gabriel and Mr. Sayward were in the latter's office; I believe that was all; I spoke to all hands about the \$500; they agreed to give me the money, and I went up to Mr. Gabriel's store and he gave me a cheque; before that, however, Campbell told me to meet him at Capt. Clark's office; got the cheque and carried out Campbell's instructions; when I got there he asked me if I had got the cheque; I said yes, and he said "Well, we will go to the bank and draw the money;" we went and drew the money, and he took it out of my hands and counted \$250 out, and gave me \$250; he put the other \$250 in his pocket; I asked Mr. Campbell several times if there was any coal on the island and he told me he didn't think there was; also asked Mr. Kennedy if the government would take Campbell's survey; he said yes, as he was a government surveyor; asked Kennedy what he got for his interest in the mine, and he told me that he had got about \$400 or \$500, and thought that I would get about \$350 for my underground rights; I did get that sum; when I got that amount I signed a document in Mr. Mill's office; that is my signature on the document produced marked "B;" signed another document in Mr. Sayward's office when I got the \$500; the document produced marked "C" bears my signature.

Cross-examined by Mr. Pooley—The second time I saw Campbell was on the 2nd of May, with Mr. Kennedy and Mr. Wilkes; do not know if Mr. Wilkes surveyed the place or not as I was not there; I told Campbell the shaft was on my land; I did object to the way the lines were run as I wanted them drawn the way I had taken my land up; I attempted to make several trips with Kennedy to bring Campbell from Orcas Island; the first trip we made Campbell was not there, the second trip we found him and brought him to Tumbo Island;

we got on to the island about 7 o'clock in the morning; I went home to my house and that same day came down and told Kennedy that I objected to the way the lines were drawn on my land. I wanted them a little to the eastward; I told them the lines should be drawn as I wanted them because I had the first right to the island; I did not in the presence of Mr. Kennedy and Mr. Wilkes say that I would make the company pay dearly for it, as Mr. Gabriel had not treated me rightly; neither did I say that I would make the company pay for every gallon of water used if they put an engine on the land; I made the remark that I would sell out if they would give me a good price; I wanted to sell out my farm and the whole business to them; had on the 4th of April sold my underground rights; was not alluding to the particular shaft that the company was going to sink, that I wanted a good price for; it was the whole of the farm, 160 acres; only a small part of my farm is good; Campbell and Kennedy returned to the island about the 27th May; Mr. Wilkes came up with them; there were six or eight miners; that was after the survey; then it was that the shaft was staked off; did not on this occasion demand \$1,000 from the company before any shaft was put down on my land; Campbell asked me to come down to Victoria to see the company and I went; do not remember telling Mr. Wilkes not to do any work on that shaft till I returned; when I met the company there was a little talk; did not agree to give them all the timber on the land, only enough for the shaft, in consideration of the \$500; when I met Mr. Campbell at Capt. Clarke's store, I think Mr. Muirhead was present; did not show them the cheque until we got to the bank; they asked me if I got the cheque and I told them yes; Muirhead and Campbell did not advise me to deposit the cheque neither do I remember Muirhead telling me that the cheque was drawn on the bank of B. N. A.; Campbell identified me at the bank as Isaac Tatten; I drew the money and Mr. Campbell took it and counted it out; he counted \$250 for himself and gave me the other \$250; the money was in \$50 bills; I put \$200 in the bank and kept \$50; we came out of the bank together; I went one way and he the other; we had a drink together afterwards; Campbell asked me if I would give him half when we were alone on the island; I do not remember whether any one was present at the time; do not know if Gabriel and Muirhead left Sayward's office together; I did not state on the 9th of May in the presence of Mr. Campbell, Mr. Kennedy, Mr. Muirhead and Mr. Wilkes, that the company had paid Kennedy \$4,000 and that I was going to make them pay handsomely for it; I know Mr. Henson; did not tell him that I had banked my \$500.

To Mr. Drake:—Tumbo island is almost two miles long; there are about 250 acres; I have my homestead and preemption certificates, one at home and the other in the land office; first knew Kennedy in March 1886; cannot tell on what date I met Campbell; did not see him there before Olsen came.

To Mr. Mills:—Was told on the 4th of April that I would be entitled to compensation if my surface rights were touched.

T. B. Hall, sworn, deposed as follows: My place of business is on Store street; have an interest in the Tumbo Coal Company; know Mr. Campbell and have seen Mr. Kennedy; Mr. Campbell has one-sixth interest in our company; do not know Olsen; had no conversation with Campbell; was introduced to him at one of the meetings at Mr. Sayward's; Mr. Campbell

said that the coal limits were a good property and by spending a little money on developing they could be sold well; the next thing, if I remember correctly, was to get all Tatten's rights and I was under the impression that we had all these rights until I was told that our rights were surface; I understood when we bought the rights we could do as we liked on the island; Campbell has repeatedly told me that the property is good; remember the meeting when Tatten came down with regard to the shaft; we all demurred against paying him that money; it was upon Campbell's suggestion that it would be better to pay the money and have the matter settled at once that the money was paid; Campbell never told me that he was going to get half of the money; no one ever told me personally that I should buy the mine; knew very well that \$7,500 was to be paid for the property; really cannot say what conversation took place on that point when Campbell was present except that the mine might bring \$25,000 if it were developed; never knew Kennedy until he came to our office and introduced himself; he told me that he had \$100 against the company; told him it was the discount on the note I knew of it as Mr. Campbell had already told me of it; he expressed surprise at that and said that he and Campbell were not on speaking terms; told him that if \$100 was due him he should have it; he told me the reason he and Campbell were not on speaking terms was that the latter had refused to show him the report; he then left my office.

Cross-examined by Mr. Pooley:—It was not Mr. Campbell who induced me to join this company; no inducement was offered; I went in of my own free will, in consequence of what I heard from Mr. Gabriel; he told me that two or three Japanese had been up there and had pronounced it a good property; Mr. Gabriel did not tell me at that time that the Japanese had made a report in writing; had not seen Campbell's report; I got my impression that we could do as we liked on the island from the conversation that took place in Mr. Sayward's office; it is quite possible that I asked Campbell what his opinion of the mine was; was not told when I went into the company that \$2,000 had already been expended, and do not recollect Mr. Campbell saying that the work that had already been done was perfectly useless. Mr. Hall here said that he could not possibly take an interest in what was going on as he had so much to do with his own business, and it was almost impossible for him to remember the conversations that took place last spring.

To Mr. Drake:—Went into the company on Mr. Gabriel's representations; Mr. Kennedy was in my office several times on that \$100 business; do not know, as a matter of fact, that a note was given to Mr. Kennedy; I have a quarter interest after Mr. Campbell's sixth interest is deducted; Mr. Gabriel is the financial manager, and all accounts pass through his hands.

To Mr. Mills:—Mr. Gabriel told me that he had perfect confidence in Mr. Campbell's opinion; did not know Campbell before I entered the company; and had parted with no money when I first entered the company.

Mary Olsen, sworn, said:—Am the wife of Mr. B. Olsen; knew Campbell and Kennedy; saw them first in my house on Douglass street; am living now on View street; they came to the house in the forenoon to see my husband and myself about a coal mine; heard a conversation; Campbell and Kennedy called my husband a fool and a silly for not going to Gabriel and getting his money, and they wanted him to

meet them at Gabriel's store in the afternoon to get the money; my husband never went out of his house that afternoon, as he got excited; they told him if he did not do as they wanted him to do, they had plenty of friends in San Francisco, and only had to write a letter and he and Mr. Lang would be killed; they wanted my husband to go to Gabriel's and get the money and divide it between them; Kennedy was present all the time; they told Mr. Olsen to get his money as quick as possible, and if he thought he was cheating himself, he was working for Mr. Gabriel; they never said anything about the coal on this occasion; Mr. Campbell told my husband that he had better get his money before he (Campbell) went to work in the mine; he said he had made \$2,000 and, with a snap of his fingers, said he could make plenty more from the company; Campbell and Kennedy said Gabriel was a thief, and would take the bread out of my husband's mouth, and when he found out that there was no coal in the mine he would not pay, that is the reason Olsen should get his money; on Sunday evening Mr. Campbell came to the house just as I was going to church; my husband was in San Francisco; he wanted to know what arrangement my husband had made about the mine before he left; told him I didn't know; he wanted to know why my husband had gone away before he got the money and why he had left it in Mr. Gabriel's hands; he wanted me to go on Monday with him; said he could get money for me and if he could not get it on Monday he would get it on Thursday at the latest; I told him I did not know my husband's business; Campbell went away saying he would be back on Monday to see me before he went to the mine; I never saw him after that at the house; Kennedy came once or twice with my husband and once when he was away; he also wanted to know the reason that my husband had not got the money before he went away; Kennedy said nothing about Campbell but said the mine was no good and after Campbell went up to the mine Olsen would not get a cent; Kennedy intimated that he was advising this on account of myself and the children; about 2 o'clock one morning Campbell came around the house, when I was alone; he tried the back gate and hearing the noise I got up; I opened the window and asked who was there; he said, don't get frightened, it is me; I looked close into his face and saw it was Campbell; he came close to the window and I got frightened and let the window down and hollered twice; Campbell ran across a field; I am afraid of Campbell because I never liked his face, and warned my husband against him.

Cross-examined by Mr. Pooley:—Cannot remember the date when Campbell first came to my house; it was last year; had never talked to anyone about this matter; I never had a chance to speak to the police about some one coming to my house at 2 o'clock in the morning, because I have been sick; am quite sure that Campbell is the man who came to the house; have never talked to Mr. Gabriel about this matter; was told by the lawyer to come to the court; had no conversation with anyone as to what I was to say; have never told anyone what I was going to say here; signed a paper of the evidence I was to give here with the lawyer; I can swear on the Bible that the man who came to the house at 2 o'clock in the morning was Campbell; the first time Campbell and Kennedy came to the house they had a glass of punch; when I came in they were fighting; I mean by that they were quarrelling; I did not see them drinking as I went into the kitchen; they started to quarrel when Campbell talked

about the mine and my husband got mad; about half an hour after Lang came; they stopped quarrelling; as soon as he came I left the room; they started to quarrel again.

This closed the evidence for the prosecution. Mr. Drake said he would like to cross examine all the witnesses.

Chas. Gabriel (re-called), cross-examined by Mr. Drake—I charged Mr. Kennedy with conspiracy for obtaining a larger sum of money than there was any necessity of; the court will be the judge of "necessity"; when I first saw Mr. Olsen he told me that he and some others had discovered some coal; he told me that it was Mr. Kennedy; told Mr. Olsen that if this mine was good I could find capital; the prospecting licence was taken out some time after that; Mr. Harris, Mr. Kennedy and myself went over to get the license; sent up two Japanese before the prospecting license was taken out; they told me that there was plenty of coal all under the seam; did not tell Lang that I was satisfied with the report of the Japanese, but told Campbell so in his presence; cannot tell the exact date of the month that I went up to the island, but think that it was December; Mr. Prior said the island was worthless as far as the coal was concerned; did not believe him, as I don't think any man would be able to judge who had only made a cursory examination; he did not go far on shore; sent the Japanese up to Tumbo Island in charge of my brother, who is a gold miner; was introduced to Campbell by Olsen; Campbell gave in a report [report read]; I know Mr. Wilkes; we engaged him to sink a 400-ft. shaft; the Japanese did not do much work; have only a half interest and never tried to get a further interest; there was never any row between Kennedy and myself; thought at the time the price paid was too high, but Campbell's arguments convinced us. We have paid \$5,400 between Kennedy and Olsen; Mr. Wilkes said that the coal on Tumbo Island was the very best he had ever seen; Messrs. Hall, Sayward and myself agreed to pay Tatten the \$350 for the underground rights; the total amount paid in respect to the mine was between \$8,000 and \$9,000; promised to pay Kennedy and Tatten \$3,750 for the mineral claims; Tatten signed the agreement; [the original agreement was here read aloud in court by Mr. Gabriel]; Mr. Kennedy has fulfilled his part of the agreement; I charged Kennedy with conspiracy on evidence that has already been produced in court; after Kennedy had been purchased out men were sent to sink the shaft; had a special agreement with Olsen; Kennedy was present when that arrangement was come to. [A document signed by Mr. Gabriel was read aloud; stated that Gabriel had paid Olsen \$3,750]; Kennedy signed a receipt for \$7,500 to Mr. Pooley; took three trips to Tumbo Island; don't know the dates; Kennedy and Campbell slept together in a room on the steamer; they told me they slept in the one room; knew they slept together, because early in the morning they came out together; do not remember telling Kennedy to buy Tatten out for \$350; if Campbell had acted honestly we would not have paid Tatten so much; Mrs. Campbell told Mrs. Wilkes that Campbell had received \$1,000 from Kennedy; Kennedy brought samples of coal from Tumbo Island and analyzed them; the samples were good; the Japanese reported favorably on the mine; induced Mr. Hall to become a partner on the strength of Campbell's report; Wilkes was introduced to me as a man having a great deal of experience in shaft-sinking

To Mr. Mills—Purchased the mine on Mr.

Campbell's advice; he put the value of \$25,000 on the mine; Kennedy and Olsen's interests were estimated as being worth \$10,000; Campbell and Kennedy were bitter enemies; they both told me that they never saw one another; gave Kennedy \$500 in cash because he wanted to go to Alaska; you (Mr. Mills) advised me not to pay the cash, because you thought the men were defrauding me.

W. P. Sayward, re-called for cross-examination by Mr. Drake—Joined Mr. Gabriel in the Tumbo Island company about a year ago; it was about the time the Japanese went up to make an examination; received a verbal report from Mr. Gabriel that the property was good; the report was so favourable that I went to see the property; when I saw it I was not favourably impressed; was a party spending some money before Mr. Campbell went up; saw Mr. Campbell's report in March last; the report made by Mr. Campbell was a geological report; this report says there are indications of coal; did not go so much on the report as I did on the conversation I had with Mr. Campbell; Mr. Prior went to the island with me, and his opinion coincided with mine; would have placed some reliance on Mr. Prior's report, only he had no opportunity to form a report; Mr. Prior is a mining expert; his opinion would have been better in my estimation than that of Mr. Campbell; know Mr. Wilkes; he took a contract to sink a shaft; Mr. Wilkes thought the measures good for coal; Mr. Wilkes' contract was to sink 400 feet at 10 per foot; for the \$350 paid to Tatten we expected to get the mineral right; only saw Mr. Wilkes a few days ago; he made no statement to me regarding Tatten's lines and the place where the shaft was sunk; am under impression that Mr. Wilkes was at Tumbo Island before I paid Tatten \$500; the reason why I think too much was paid Campbell and Kennedy was that he had been humbugged through reports and statements; Mr. Kennedy made no statements; Mr. Campbell always reported the mine in a favourable light; don't know that the reasons were correct; have no reasons for taking proceedings against Kennedy, only that he was a party to the conspiracy to get money out of the company; do not know whether Mr. Kennedy had something to sell; bought something from Mr. Kennedy; know nothing about the value of the property; it remains to be proved whether we paid too much; if we found a valuable coal field we would not have paid too much; we cannot tell the value of the mine unless we sink a shaft; had no knowledge of Kennedy being a party to the conspiracy until these proceedings were taken; did not give instructions for these proceedings.

To Mr. Pooley—I think I introduced Mr. Wilkes to Mr. Gabriel and said he was an experienced miner and we could depend on his report; Mr. Wilkes went to the island with Messrs. Muirhead and Campbell; when Mr. Wilkes returned he said he was favourably impressed; after Mr. Wilkes' return I let the contract to sink a shaft; if Wilkes had been unfavourable, I don't know what I would have done; was not present when an agreement was made to pay Mr. Kennedy \$3,750; was in favour of paying him \$2,500 and the balance when we struck bed-rock; was not in favour of paying him \$3,900; we did not meet when the agreement was made to pay Kennedy \$3,750; objected to the agreement before it was made; find no fault with Mr. Campbell's report on the coal mine; Mr. Campbell went up with Mr. Wilkes and made surveys; Campbell said Tatten would allow no one on his land unless he

was paid; the result was that I sent Campbell to Tumbo Island for Tatten, and paid him \$500 for permission to sink the shaft; Tatten agreed to allow us to open the mine and roads and to allow us use timber for general mining purposes; I do not know how much work was done by the Japanese; if a witness states that there is only enough work done for a man to cover with his hand he is drawing on his imagination.

To Mr. Mills.—Before proceedings were taken I heard Olsen's statements and Tatten's statement regarding the \$500; I agreed to these proceedings before action was taken; Campbell valued the mine at \$25,000, and thought if we got it over \$10,000 we would get a good bargain; I did not place much reliance on the Japanese report, but I did place much reliance on Mr. Campbell's report; I inferred that Campbell and Kennedy were not friendly, and I did not know that they were holding meetings; I spoke to Mr. Wilkes before any arrangement was made and asked what he would charge for sinking in sandstone; Campbell went up with Wilkes and gave up the contract because it did not pay him.

Charles Wilkes said: "I have been a coal miner for 28 years; Mr. Sayward sent for me and introduced me to Mr. Gabriel; they asked me to explore a mine on Tumbo Island; went there and selected a spot for a shaft; when I returned to Victoria told Mr. Sayward I saw the best indications for coal on the island; Mr. Gabriel said to me that the Japanese told him the indications were good; went to Tumbo Island in the steamer Hope to sink a shaft; there were nine men at work, and Messrs. Campbell, Wilkes and Muirhead arrived there next day and started to work; Tatten came to the shaft where we were at work; we started to sink the shaft on Tatten's ground.

To Mr. Mills—I did not say what date I went to survey the land; had a contract to sink the shaft at \$30 per yard; threw up the contract because the men would not work; was not going to work all summer for nothing; from the word go the company acted the second best towards me; Mr. Sayward would not pay me and sent me to Mr. Gabriel; I do not know anything about signing the contract; you will get very little out of me.

Allan Muirhead, sworn, said: I know all parties connected with this case; went to Tumbo Island on 3rd May with Wilkes and Kennedy; Campbell left us at Clover Point; on the 5th we reached the island; after arriving there I marked a tree and Mr. Wilkes said it was the best place to sink a shaft; in the evening Tatten came to the tent and Wilkes asked him to look at the shaft; Tatten said he wanted the lines changed and the shaft would then be on his (Tatten's) property; Tatten said if they could afford to pay Kennedy \$4,000 they could pay him \$1,000 for sinking the shaft; we went for Mr. Campbell on Thursday; did not get him; on Monday they brought Campbell; Tatten showed him his boundary post and his line; the eastern line was cut through the bush; the shaft was about a chain and a half outside Tatten's line; we started surveying and Mr. Campbell was chief surveyor; next morning Tatten told Campbell that he wanted the lines changed further east; he said "I have the first right on the island and will have the lines where I like;" he finished the survey, and before he left Tatten came to the tent and said he wanted \$1,000 before he would allow the company to sink on his land; Campbell said he might get \$200 or \$300; Tatten said he would not take less than \$500.

Tatten also said the company did not use him right, and he was going to make them pay; they had no water on their land, and he was going to make them pay for water; we returned to Victoria; Campbell called a meeting of the company; I was present; Mr. Campbell told the company that Tatten wanted \$500. Wilkes corroborated Mr. Campbell's statement and said the best indications for coal existed on the island. Mr. Gabriel asked me to draw up the agreement with Mr. Tatten; I returned to the island with Mr. Campbell and ten others; we laid out the shaft and Mr. Campbell to come down, the company wished to see him; Tatten told Wilkes not to start work on the shaft before he returned from Victoria; Campbell asked me to take the agreement to Mr. Sayward's office; the company held a meeting and there were present Messrs. Hall, Sayward, Gabriel, Tatten and myself; Mr. Gabriel told Tatten that the company had no right to pay Tatten \$500; Tatten became angry and said he would go back; finally they agreed to pay \$500, and the agreement was signed; I went into the outer office to insert a clause regarding timber for mining purposes; Mr. Gabriel followed me and said that he wanted to get even on Tatten who could neither read or write; he asked witness to insert a clause giving the company all the timber they required; I refused to insert the clause; Mr. Gabriel left the meeting in company with Mr. Tatten; I went to Capt. Clarke's store with Mr. Campbell; after leaving Capt. Clarke's we met Mr. Tatten; the latter was shaking a cheque and said he had \$500 from the company and intended to get \$200 more; Tatten asked witness to identify him at the bank; I did not care about going and told Tatten to ask Mr. Campbell to identify him; Campbell came from the bank about five minutes before Tatten; the latter came to us and said he banked the money. After the contract was thrown up I was engaged to go to Tumbo Island to take charge of the company's tools. I remained on the island for two months, expecting a few days when I came to Victoria to find out whether the contract was let. I did not know Mr. Kennedy when he received \$3,350; Mr. Campbell and myself met Olsen one Sunday afternoon near Wriglesworth's store; Olsen asked Campbell to help him get some money from Gabriel as he believed the company would try to swindle him. Campbell said he would have nothing to do with it.

To Mr. Mills—Mr. Campbell introduced me to Mr. Gabriel; I have known Mr. Campbell for two years; Mr. Campbell engaged me to survey the island; I went to Mr. Campbell's last night; what we were talking about you will never get from me; we talked about everything in general and nothing in particular; we did not speak about this case; on Sunday last went to Mr. Campbell's we spoke about the case; I wrote the agreement at Mr. Campbell's residence; a portion of the agreement was taken from a form supplied by Mr. Campbell; I received no assistance in drawing up the agreement from Mr. Campbell; Mr. Gabriel instructed me to draw up the agreement; Mr. Campbell told me to take the agreement to the meeting of the company; I was first introduced to Mr. Campbell by Mr. Eli Harrison; I have had a little experience in engineering; I remember meeting Messrs. S. P. Mills and Gabriel, and I said the company had treated me right; Campbell had used me like a gentleman and I did not wish to say anything about the case; Mr. Campbell introduced me to Mr. Kennedy.

This closed the evidence for the defence, and after some argument from counsel on both sides the defendants were bound over, Campbell in the sum of \$2,500 and Kennedy in \$1,000, to appear at the next assizes.

Disastrous Colliery Explosion in Pictou Co., Nova Scotia.

[Special to The Canadian Mining Review.]

Westville Pictou County, N. S. Jan. 16th. 1888.—Yesterday (Sunday) about 2 p. m. the inhabitants of this town, were startled by a severe shock which shook the buildings like an earthquake, and on looking out to ascertain the cause, dense volumes of smoke and flame were seen issuing from the New Winning, a coal mine at the Albion mines about two miles distant, owned by the Acadia Coal Co. Ltd. Your correspondent at once proceeded to the scene of the accident, and was gratified to learn that no lives had been lost. The seam worked there lies some 100 feet below the Cage Pit seam which has been on fire for over seven years, and during the past summer, the management decided to extract the Pillars out of a portion of the New Winning with the result that the roof gave way, making a connection with the Cage Pit in which it was soon discovered that the fire still existed; the extraction of the Pillars was at once discontinued, that portion of the mine built off, and to all appearance made secure and safe. From inquiries made on the spot yesterday it appears that an accumulation of gas in the Cage Pit had come in contact with the fire during Saturday night and the explosion thus caused blew down the building between the Cage Pit and the New Winning. As soon as this became known General Manager Poole and a large force of officials and workmen at once went to work to rebuild the buildings and once more cut the connection between the two mines. A temporary stopping having been put up the whole of the men proceeded to the surface, and the last of them had only been a few minutes on the surface when a terrific explosion took place, sending a stream of flame out of the two Slopes which set fire to the bank house, an extensive and well equipped building at one end of which stood two winding engines and a boiler house containing three multitubular boilers. In a few minutes the whole buildings were a mass of flames and were soon totally destroyed; the engines and boilers being seriously damaged, if not rendered entirely useless for further use.

At the time of writing I have not ascertained whether the explosion has set fire to the coal in the New Winning but under the most favorable circumstances the work of re-opening the mine will be a very difficult task owing to its connection with the Cage Pit.

The loss to the company will be very great; but it is a great consolation to them and the community at large that the explosion took place at the time it did; had it been when the miners were at work the loss of life would have been fearful. It was indeed a sad sight to stand by and see such a destruction of valuable property, but what sadness would have been added to the scene had wives and mothers been there mourning for loved ones lost.

The output at this mine was over 200 tons per day, and a great number of men and boys will be thrown out of employment, but it is expected the management will be able to find employment for many, if not all, at their other mines shortly.

Since the commencement of coal mining at the Albion the following pits have been lost by

explosions: the Bye Pit, the Dalhousie Pit, the Foster Pit, the Foord Pit, Cage Pit, and last, the New Winning; and it is an unfortunate fact that the whole of these pits are connected.

An Improved Method of Laying Coal-Dust in Mines.—Mr. T. O. Robson* gives a description of an apparatus attached to an ordinary water-tub which is made to travel along the wagon-ways of a colliery. The water is conveyed from the tub through a hollow spindle projecting at the back through a stuffing-box, and having at its outer end a hollow boss perforated round its circumference. Over this boss is fitted a chamfered wooden boss similarly perforated and surrounded by a circular bristle brush. The wooden boss is made removable, so that the brush can be renewed or repaired. The spindle, boss and brush are made to rotate by means of an endless chain and tooth wheels connected with one of the axes of the tub, and a simple stop-valve is added to regulate and cut off the supply of water. With this apparatus 100 gallons of water have been sufficient to thoroughly saturate 1,700 yards of way, a superficial area of 150,000 square feet, the tub travelling at a speed of about four miles an hour.

A Fire-Damp Indicator.—At the Manchester meeting of the British Association, Mr. J. Wilson Swan read a paper on fire-damp indicators. The old tests for the presence of fire-damp in coal mines have become entirely insufficient. It is now a matter of vital interest to ascertain the presence of small proportions of fire-damp in pit air. The danger is usually tested by means of the flame of the safety lamp, which shows, by elongation, when the air had become foul to the extent of 2 per cent. of fire damp; but it would show nothing at all if the proportion was less than 1 or 2 per cent. Yet 1 or 2 per cent. is quite a dangerous proportion if the air is heavily laden with coal dust, and there happens to be a long tongue of flame projected into it by a blown-out shot. The author has been lately striving to supply the want of a more sensitive indicator of fire-damp, and the outcome of his efforts was the apparatus he exhibited. With this apparatus tests were made for fire-damp in various parts of a colliery; in a well ventilated portion of the pit one-eighth of 1 per cent. was detected, and near a blower of gas 6 per cent.

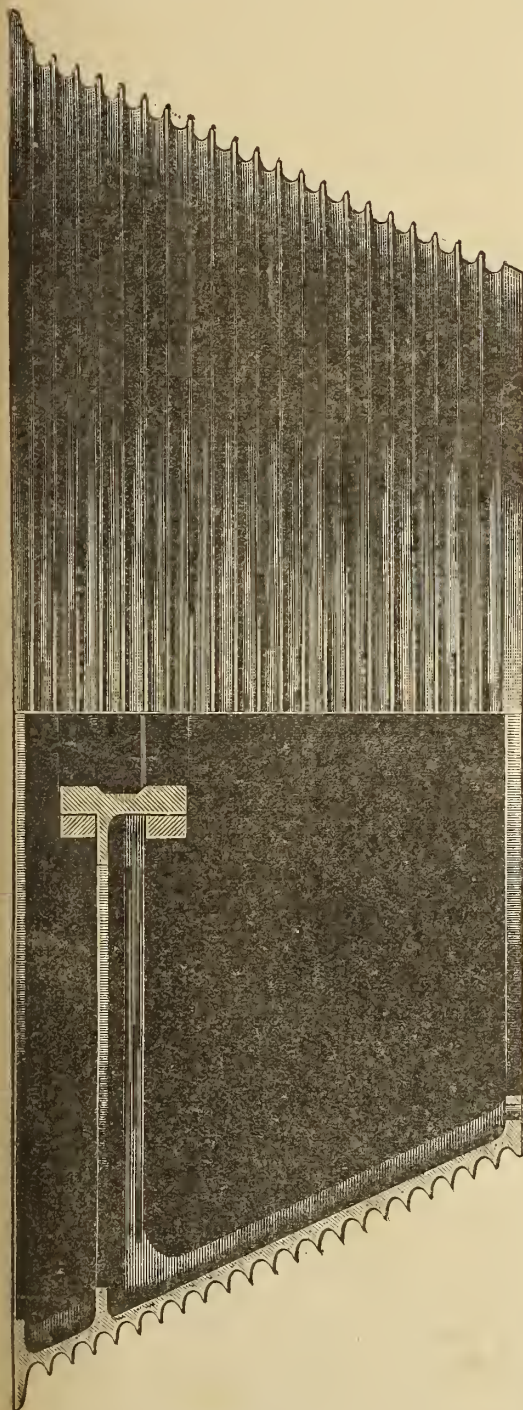
Long-wall Working in Successive Stages.—According to C. Demanet,† the use of self-acting inclines worked by the weight of the descending tubs is open to considerable objections in cases where the proportion of dirt is excessive as compared with coal. The objections may be obviated by having recourse to the following methods:—The inclines are laid with a single road, and a small hauling engine, worked by air at a pressure of from 45 to 60 pounds, is fixed at the foot of each incline at its junction with the gate road. The engine is mounted on a bed-plate about 5 feet long by 3 feet 3 inches wide, and has a drum about 2 feet 3 inches diameter by seven inches wide, capable of containing 275 yards of rope $\frac{1}{2}$ inch diameter, and driven by gearing at two different speeds of 6 to 1 and 4 to 1 respectively. The cylinder is an oscillating one with reversing gear, and is $5\frac{1}{2}$ inches diameter by 10 inches stroke. During the day-shift, when there are only empty tubs to be drawn up to the working face, the quick gear is employed.

Wire Rope Haulage and its Application to Mining.

By Frank C. Roberts, C.E., Philadelphia, Pa.*

Progress in the facilities for handling mining products has been largely superinduced by the necessities of commercial economy rendered requisite in order to meet the demand of competition. So rapid has been the depreciation in the value of mineral products, primarily due to the disproportionate increase of output over

FIG. 1.



Fusee or Conical Spiral Drum.

consumption, that it may be justly claimed that mining, when considered as a commercial success, depends largely upon the ease and cheapness by which the products are brought to the surface of the ground. In all methods of performing this operation, wire rope enters as an important factor; and the object of the present sketch will be to explain, as fully as is consistent with the space allotted, the various adaptations of wire rope employed in placing coal and ores within the reach of our overground systems of transportation.

These adaptations will be considered in the following order:

- I. Hoists.
- II. Inclined planes.
 - a. Engine planes.
 - b. Gravity planes.
 - c. Aerial planes.
- III. Haulage.
 - a. Tail-rope system.
 - b. Counter-rope system.
 - c. Endless-rope system.

I. Hoists.

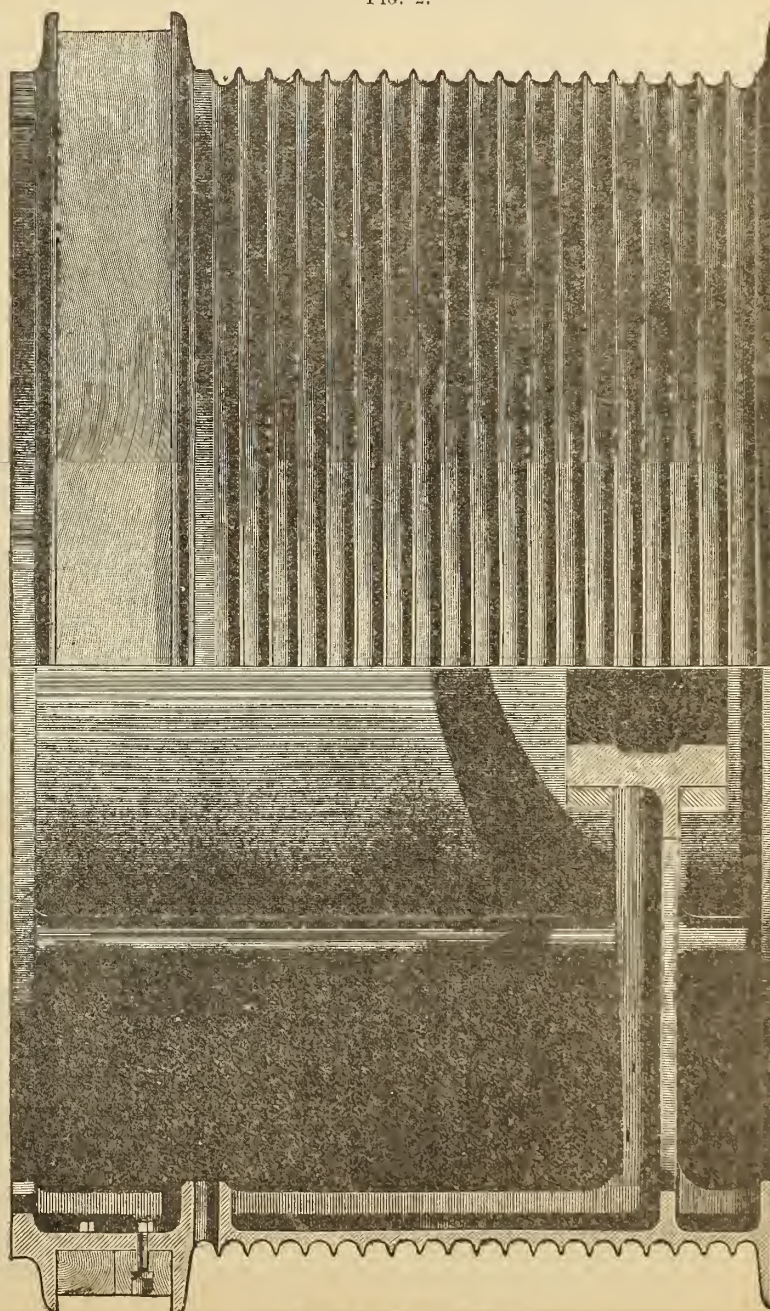
The term "hoist" is applied to the system whereby the mine-product is elevated from the mine-level to the surface through vertical shafts. In our country this system finds its widest application in the anthracite coal-regions, where it is the prevailing method. The principle, briefly described, is as follows: A vertical shaft is sunk to the level which it is proposed to operate, and from this point the various workings penetrate. At the head of the shaft is placed an engine with a wire-rope drum attached. To this drum is fastened the hoisting-rope, which is led over a grooved wheel and

attached to the carriage or cage upon which the cars rest while they are hoisted. The cage being at the foot of the shaft, loaded cars are run upon it and the signal is given to the engineer to start the hoisting-engine. In this manner the cars are hoisted to the surface and switched off to their destination.

Hoists may be divided into two classes, viz: *single* and *double* hoists. The former have a single shaft and drum, with a non-reversing hoisting engine, the cars being lowered by means of a friction clutch attached to the rope-drum, and sufficiently powerful to hold the cage when loaded in any position. This system is exceedingly economical of fuel, the work of the engine being almost constant. The *double hoist* consists in a plant of two shafts or shaft-compartments and drums, with the hoisting gear so regulated in operation that when an empty car is descending on one side a loaded car is ascending on the other. This arrangement requires, of course, a reversing engine; and although the plant is more expensive in instalment, it is to be recommended where large capacity is required.

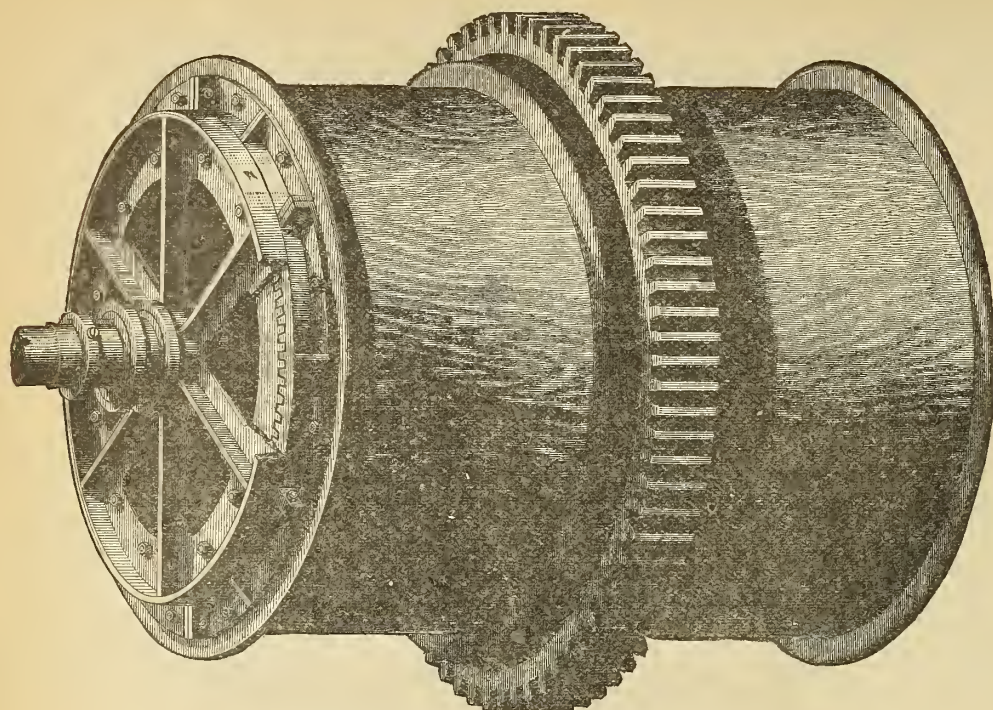
Two types of hoisting-engines are constructed viz, *first* and *second-motion* engines. In the

FIG. 2.



Parallel-spiral-grove Drum.

FIG. 3.



Drum for Hoisting from Different Levels.

former, two engines with cranks at right angles, to each other are coupled direct to the drum-shaft; in the latter, the engine carries a pinion, meshing with a spur-wheel keyed to the drum-shaft. The rope-drums in either case are proportioned in diameter to the size of the rope employed, and in length to the depth of the shaft. In single shafts but one drum, of course, is necessary, but double-shaft hoisting-engines are provided with two rope-drums, each having its separate rope.

Fig. 1|| illustrates what is known as the fusee or conical-spiral drum. Two of these drums are placed end to end on a common shaft with a strap-brake seat between them. The wire-ropes are attached to the small ends of the drums and the engines wind one rope while unwinding the other. In this manner the leverage of the rope performing the function of hoisting is diminished, while the descending rope has an increased leverage; and, as a result, the work done by the engine is more uniform and the gentle starting of the lead is more easily accomplished. These drums vary between 5 and 15 feet in diameter, and are of such lengths as may be suited to the depth of the mine.

Fig. 2 represents the parallel-spiral-groove drum, which has a wide application, although lacking the advantage obtained in the fusee by the equalization of leverages. When applied to double hoists, two of these are keyed to one shaft, the end-flanges being bolted together. The ropes are attached as to the fusee, one winding while the other is unwinding.

In many mines or shafts, work may be progressing at different levels below the surface. Fig. 3 illustrates a design of hoisting-drum suitable to such requirements. It will be seen that, by means of a toothed wheel, the driving-power is transmitted to the drum, the arrangement being such that the gear meshes with a circular rack fixed in the end of the drum. When it is desired to adjust the length of the rope to a different level, the wheel is slipped out of the rack by means of a lever, and the drum is revolved until the proper length of rope is wound or unwound. The wheel is now returned to its former position, and the drum is ready for use.

In a vertical hoist, the wire rope, after passing off the drum, leads to what is known as the *head sheave* (Fig. 4), which is so located that its outer circumference is directly over the centre of the pit, and from which the rope leads vertically downwards into the mine and is attached to the *cage* upon which the mine-cars are hoisted to the surface. Fig. 5 represents a modern hoisting-cage, such as is used in the coal regions. Upon two opposite sides of the pit are located the guide-bars, which are usually constructed of hard wood. In order to pro-

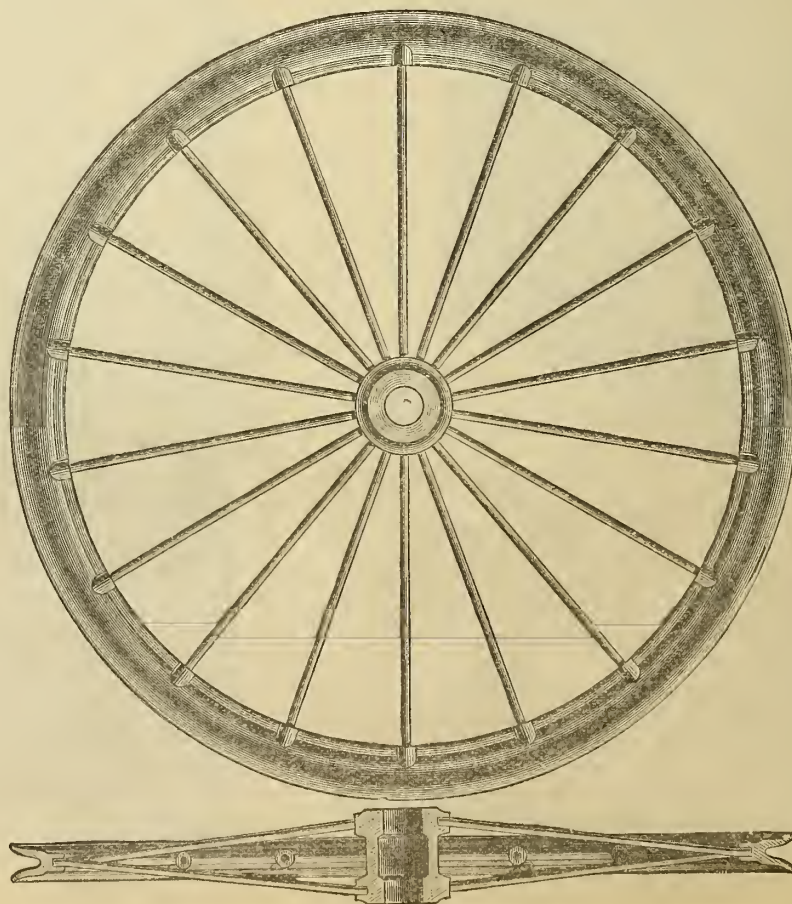
vide against accidents in case of the rope breaking, the cage is provided with safety-catches, the action of which is such that the instant the tension on the rope is released the quadrant-racks shown at the side of the cage imbed themselves in the guides and the cage is arrested in its descent. This movement is affected by a series of rubber springs set in telescopic distance-rings through which the draw-head-bolt passes, the whole being encased in the spring-pocket shown underneath the draw-beam. When the rope is in tension, the draw-head-bolt passes through and underneath the spring pocket and compresses the springs; but upon the release of the tension in the rope the springs push the draw-head-bolt in toward the centre of the cage, and thus act upon the levers connected with the quadrant-catches.

Another arrangement contributing towards the safety of hoists is that known as *cage landing-fans*. These consist of arms or prongs so arranged that the cage with its contents is landed upon them, where it is perfectly secure until the car is run on or off. The signal being given to lower, the fans are thrown back by means of a series of levers, and the cage is allowed to descend.

In connection with safety-apparatus may be mentioned the *hoist-indicator*, whereby the position of the hoisting-cage is shown at any moment. This is useful to prevent "overwinding." The simplest arrangement of this device is worked from the drum-shaft by means of a worm and gear actuating a pointer on a dial.

In addition to the indicator as a safeguard against overwinding, all shaft-heads should be equipped with *safety detaching-hooks*. These hooks are so arranged that if by any accident or unforeseen cause the hoisting-engine is not stopped when the cage reaches the surface or the landing-place, then instead of the cage being drawn up into the poppet-head, causing its own

FIG. 4.



Head-sheave.

destruction and the wrecking of the whole shaft-head, it becomes simply detached from the rope and remains hanging in the upper guides, while the loose rope-end is merely wound round the drum.

In Fig. 6 may be seen a general arrangement of a double-shaft first-motion hoisting-plant fitted with two fusee-drums.

Ropes.—In proportioning the wire rope requisite for a vertical hoist of a given capacity, great care should be taken to assume a safety-factor of sufficient magnitude. Not only should the weight of the cage and loaded truck be considered, but also the friction of the guides and head-sheaves and the weight of the rope itself. It is the latter factor that has led many European mine-operators to employ what is known as "taper" ropes, *i.e.*, those having an increased diameter towards the drum-end. The peculiarities of each application must be noted and a safety-factor of not less than five adopted. The drums and head-sheaves must be properly proportioned to the size of the rope, or else the continual bending and unbending will soon destroy the elasticity of the wire. Nothing but the best Swedish iron or reliable steel rope should be employed. The danger to life and property is too great to permit the risk of non-uniformity in the material of the rope.

Wine rope for vertical hoists should be composed of six strands of nineteen wires each, wrapped about a hempen centre. The latter adds much to the elasticity and life of the rope. Ropes of small diameter (up to $\frac{3}{4}$ inch), with six strands of seven wires each, are sometimes employed for hoisting purposes; but their use necessitates larger head-sheaves and drums and, consequently, increased cost.

Crucible steel ropes, when composed of good material, are more durable than iron ropes, and have entirely replaced the latter in some mining regions. It must be borne in mind, however, when making a change from iron to steel, that the aim should not be to reduce the diameter of the rope, but to increase its durability.

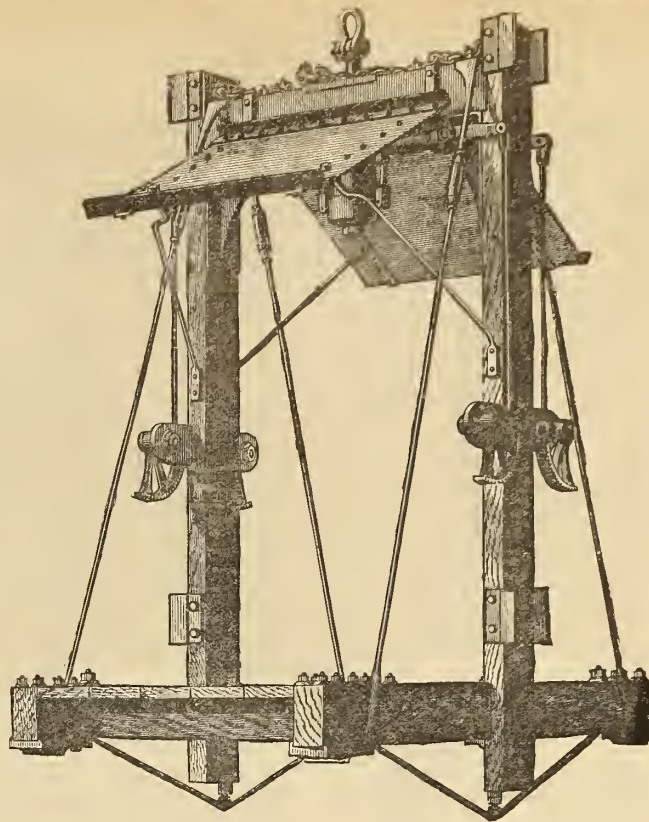


FIG. 5.

When starting the cage from the bottom of the shaft, the rope should be taut; the presence of slack causes a sudden and dangerous stress in the rope. The following table shows clearly the necessity for care in this direction :

*Table of a Series of Tests Showing the Extra Stress upon
a Hoisting-rope due to a few inches of Slack Rope.*

<i>First Test.</i>		Strain in pounds.
No. 1,	Empty cage, lifted gently.....	4,030
No. 2,	“ “ “ “.....	4,030
No. 1,	With 2½ inches slack rope.....	5,600
No. 2,	“ 2½ “ “ “.....	5,600
No. 1,	“ 6 “ “ “.....	8,950
No. 2,	“ 6 “ “ “.....	8,950
No. 1,	“ 12 “ “ “.....	12,300
No. 2,	“ 12 “ “ “.....	12,300

Hoisting-cage.

Second Test.

Cage and 4 empty cars weighed by machine.	6,375
No. 1, Cage lifted gently.....	6,725
No. 2, " " " " " "	6,725
No. 1, With 3 inches slack rope.....	11,200
No. 2, " 3 " " " " "	11,200
No. 1, " 6 " " " " "	12,250
No. 2, " 6 " " " " "	12,250
No. 1, " 12 " " " " "	15,675
No. 2, " 12 " " " " "	15,675

Third Test.

Cage and full cars weighed by machine.....	11,800
No. 1, Cage lifted gently	11,300
No. 2, " " " "	11,525
No. 1, With 3 inches slack rope	19,025
No. 2, " 3 " " " "	19,025
No. 1, " 6 " " " "	23,500
No. 2, " 6 " " " "	25,750
No. 1, " 9 " " " "	27,950
No. 2, " 9 " " " "	25,750

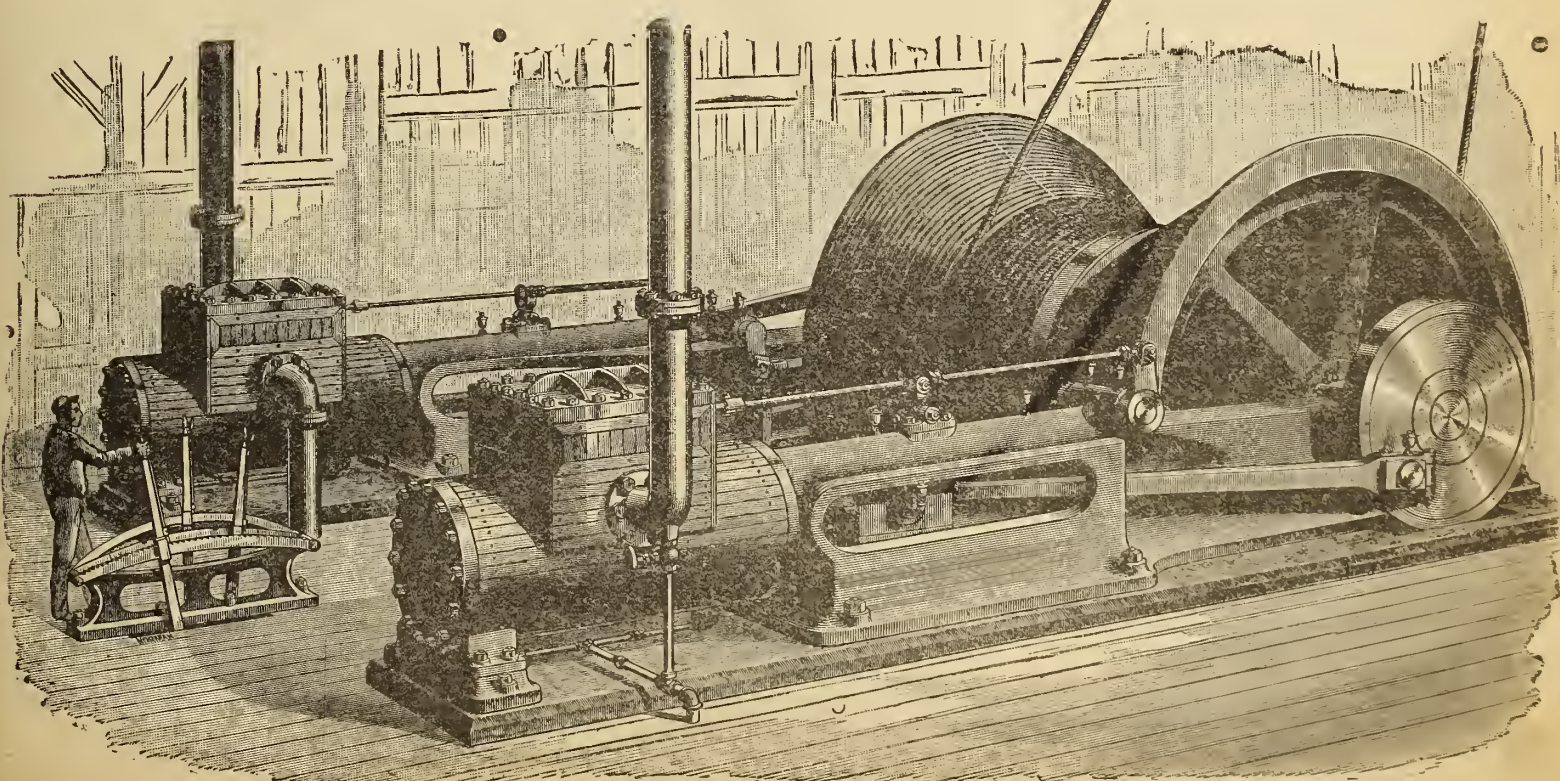


FIG. 6.

Double-shaft First-motion Hoisting Plant with Two Fusee-drums.

The following table gives the necessary data to be used in selecting hoisting-ropes of nineteen wires to the strand. It is taken from the circular of the Trenton Iron Co.

Description.				Iron.				Steel.			
Trade No.	Diameter in inches.	Circumference in inches.	Estimated Weight per foot, in pounds.	Breaking Stress, in tons of 2,000 pounds.	Proper working load in tons of 2,000 pounds.	Circumference of Hemp Rope of equal strength.	Min. size of drum or sheave, in ft.	Breaking Stress, in tons of 2,000 pounds.	Proper working load, in tons of 2,000 pounds.	Circumference of Hemp Rope of equal strength.	Min. size of drum or sheave, in ft.
1	2½	7	7.75	74	15	15½	8	164.69	32.9	....	9
2	2	6½	6.11	65	13	14½	7	132.37	26.5	....	8
3	1¾	5½	5.09	54	11	13	6½	108.13	21.63	....	7½
4	1¾	5	4.00	44	9	12	5	97.17	19.44	....	6
5	1½	4½	3.55	39	8	11½	4½	86.38	17.3	16½	5½
5½	1½	4½	2.90	33	6½	10½	4½	72.33	14.46	14	5½
6	1½	4	2.42	27	5½	9½	4	50.17	10.	12½	5
7	1½	3½	1.95	20	4	8	3½	38.	7.7	11	4½
8	1	3½	1.53	16	3	7	3	29.2	5.8	9	4
9	¾	2½	1.16	11½	2½	6	2½	21.55	4.	8	3½
10	¾	2½	0.85	8.64	1½	5	2½	14.99	3.	6½	3½
10½	¾	2	0.60	5.13	1½	4½	2	12.53	2.5	5½	3
10¾	¾	1¾	0.47	4.27	½	4	1½	8.81	1.75	5½	2½
10¾	¾	1¾	0.37	3.48	½	3½	1½	7.52	1.5	4½	2
10¾	¾	1¾	0.26	2.50	½	3	1				

(To be continued.)



The following is a statement *in extenso* of the phosphate shipped from Montreal during the year 1887:—

Date.	Shippers.	Ship.	Destina- tion.	Tons.
May 18	Wilson & Green..	s.s. Oxenholme	Liverpool..	613
23	Gilliespie, Patter- son & Co.	s.s. Bannewall	Hamburg ..	104
" 25	Anglo Canadian Phosphate Co..	s.s. Colina.....	Glasgow....	200
" 27	Wilson & Green..	s.s. Canopus...	Liverpool..	63
" 30	Lomer, Rohr & Co.	s.s. Gratitude...	London....	100
" 31	" " "	s.s. Southwold	do	240
June 1	" " "	s.s. Aloides....	Glasgow....	75
" 2	" " "	s.s. Katie.....	London....	220
" 7	Anglo Canadian Phosphate Co..	s.s. Bonnington	Liverpool..	300
" 13	Wilson & Green..	s.s. Titania....	do ..	74
" 14	" " "	s.s. Castledale.	London....	217
" 14	Anglo Canadian Phosphate Co..	s.s. " "	do	110
" 19	Lomer, Rohr & Co.	s.s. Ocean Prince	do	100
" 19	Wilson & Green..	s.s. " "	do	98
" 22	Anglo Canadian Phosphate Co..	s.s. Concordia..	Glasgow....	125
" 23	Lomer, Rohr & Co.	s.s. Merchant's Prince...	London....	200
" 23	Anglo Canadian Phosphate Co..	do ..	do	161
" 24	Lomer, Rohr & Co.	s.s. Black Prince..	do	109
" 24	Millar & Co.....	do ..	do	200
" 28	" " "	s.s. Bayswater	do	91
" 28	Lomer, Rohr & Co.	do ..	do	190
" 29	Wilson & Green..	s.s. Oxenholme	Liverpool..	661
" 29	" " "	Bar. Lady Duf- ferin..	London....	240
" 29	Lomer, Rohr & Co.	do ..	do	40
" 30	" " "	s.s. Waudra- ham..	Hamburg..	40
" 30	Millar & Co.....	do ..	do	250
" 30	Anglo Canadian Phosphate Co..	do ..	do	94
" 30	Lomer, Rohr & Co.	s.s. Colina.....	Glasgow....	190
July 5	Wilson & Green..	s.s. Henri IV..	London....	199
Aug. 6	Lomer, Rohr & Co.	s.s. Canopus...	Liverpool..	335
July 13	" " "	s.s. Westcom- berland..	London....	162
" 19	" " "	s.s. Dracona..	do	185
" 19	Gilliespie, Patter- son & Co.	do ..	do	116
" 21	Lomer, Rohr & Co.	Bar. Jeda.....	Montrose..	50
" 21	" " "	s.s. Anerley...	London....	336
" 21	" " "	Bar. Beltrees..	Fleetwood..	100
" 28	" " "	s.s. Crenow...	Hamburg..	220
" 29	Wilson & Green..	s.s. City of Lin- coln....	London....	398
Aug. 10	Lomer, Rohr & Co.	s.s. Navarro...	do	167
" 10	Wilson & Green..	do ..	do	285
" 10	Anglo Canadian Phosphate Co..	do ..	do	150
" 10	Lomer, Rohr & Co.	s.s. Aloides....	Glasgow....	187
" 11	" " "	s.s. Berbice...	Liverpool..	129
" 12	" " "	s.s. Scotland..	London....	292
" 18	" " "	s.s. Avlona....	do	90
" 20	Wilson & Green..	s.s. Oxenholme	Liverpool..	704

Date.	Shippers.	Ship.	Destina- tion.	Tons.
Aug. 22	Lomer, Rohr & Co.	s.s. Gallego....	Liverpool..	360
" 22	R. C. Adams.....	do	do ..	133
" 22	Gilliespie, Patter- son & Co.	do ..	do ..	147
" 24	Lomer, Rohr & Co.	s.s. Cynthia...	Glasgow....	223
" 27	" " "	Bar. Jessie Kennick.	Greenock..	136
" 31	" " "	s.s. Toronto...	Liverpool..	226
Sept. 3	" " "	s.s. Washington City....	London....	235
" 3	Wilson & Green..	do	do	250
" 9	Lomer, Rohr & Co.	s.s. Fri King..	do	223
" 12	" " "	s.s. Kehrweider	Hamburg..	320
" 13	Wilson & Green..	s.s. Lake Nepi- gon....	Liverpool..	246
" 16	" " "	s.s. Thorndale.	London....	318
" 16	Lomer, Rohr & Co.	do ..	do	225
" 17	Wilson & Green..	s.s. Thammore.	Liverpool..	256
" 23	" " "	s.s. Ocean King	London....	359
" 24	Lomer, Rohr & Co.	s.s. Katie.....	do	230
" 24	Millar & Co.....	do ..	do	555
Sept. 29	Wilson & Green..	s.s. Oxenholme	Liverpool..	304
" 29	Anglo Canadian Phosphate Co..	do ..	do ..	260
" 29	Gilliespie, Patter- son & Co.	do ..	do ..	54
" 30	Wilson & Green..	s.s. Canopus...	Liverpool..	398
Oct. 5	Anglo Canadian Phosphate Co..	s.s. Panama...	Havre....	216
" 5	Lomer, Rohr & Co.	do ..	do	100
" 6	" " "	s.s. Concordia..	Glasgow....	200
Oct. 13	Lomer, Rohr & Co.	s.s. Colina.....	Glasgow....	220
" 15	" " "	s.s. Grassbrooke	Hamburg..	462
" 25	Wilson & Green..	s.s. Harbinger..	London....	498
" 25	Lomer, Rohr & Co.	do ..	do	175
" 29	Millar & Co.....	s.s. Euskana...	Liverpool..	95
Nov. 10	Lomer, Rohr & Co.	s.s. Cynthia...	Glasgow....	95
" 10	" " "	s.s. Thorndale.	London....	300
" 12	Millar & Co.....	do ..	do	80
" 12	Anglo Canadian Phosphate Co..	s.s. Kehrweider	Hamburg..	353
" 12	Wilson & Green..	do ..	do	566
" 12	Lomer, Rohr & Co.	s.s. Toronto...	Liverpool..	160
" 16	" " "	s.s. Concordia..	Glasgow....	118
" 16	Millar & Co.....	s.s. Lake Onta- rio....	Liverpool..	112
" 16	Wilson & Green..	do ..	do ..	156
" 18	Lomer, Rohr & Co.	s.s. Montreal..	do ..	200
" 19	" " "	s.s. Lake Huron	do ..	200
" 19	Gilliespie, Patter- son & Co.	do ..	do ..	141
" 19	Wilson & Green..	do ..	do ..	132
" 22	Lomer, Rohr & Co.	s.s. Scotland..	U. K.....	200
" 22	Wilson & Green..	do ..	do	195
" 23	" " "	s.s. Katie.....	do	96
" 23	Millar & Co.....	do ..	do	40
Total....				19,713

As stated in our last issue, the Montreal Board of Trade gives the total amount as 20,349 tons. The difference is caused by the "ground phosphate in bags" not being included in this estimate.

In General.

Prof. Saunders, of the Central Experimental Farm, states that he has under consideration a series of experiments at the farm with ground phosphate in its raw state. The experiments will be made during the coming season.

Mr. Coste estimates the total quantity of phosphate exported from Ontario from the year 1877 to 1886 as 8,983 tons, of a value of \$110,888; from Quebec during the same period 146,044 tons, of a value of \$2,704,447. The total quantity exported from both provinces is computed at 155,027 tons, of a cash value of \$2,815,335.

Latest advices state that phosphates are reported a little higher for the low grades, the French and Carolina phosphates having advanced a halfpenny.

Mr. Adolphe Lomer, of Messrs. Lomer, Rohr & Co., Montreal, has returned from his visit to England.

We are informed that Captain Henwood, superintendent of the Emerald mine, has tried raw phosphate on his garden with most satisfactory results. He has been in the habit of taking small quantities of finely ground ore from the borings at the mines and applying it as a manure to the soil. The wonderful growth of his flowers and vegetables attest to the success of his experiment.

Complaint reaches us of the manner by which Canadian ore is handled when it reaches the other side. It is said that frequently the tests are made by interested parties, who grade the ores down below their true quality, and thus force shippers to take any price they may choose to offer. The true way to remedy this state of affairs, or rather to avoid it, is to cultivate a market on this side of the Atlantic both for the trade and the chemically treated product.

Du Lievre.

The Union mines have been sold to the Canadian Phosphate Company (Limited), which has been organized in London with a capital of 110,000 shares at £1 each, and is formed to acquire, work, and, by the introduction of additional capital, further develop the property of the Union Phosphate and Land Company, of New York, now in operation, and, it is stated, producing considerable profit. The property consists of the Star Hill, Williams and Ruby mines, 1286 acres in extent, all freehold, situated in the Township of Portland, Ottawa County, Quebec. The Star Hill and Williams mines include three distinct deposits. One of these is at present unexplored, but the other two have a length of 3355 yards, and an average breadth of not less than 100 yds., measured by the outcrops. The running so far has been conducted on a small scale, amounting to about 5000 tons annually. The cost of mining, dressing, and shipping ore, including freight to the United Kingdom, commission on sales, and all expenses in Canada, is put at £2 5s. per ton. Thus, at the lowest price ever touched, there is a profit of £1 14s. per ton, and at present prices over £2 on the first quality and £1 2s. on the second. These figures are verified by the engineer's report. The purchase money has been fixed at £90,000, the whole of which the vendors were prepared to receive in shares, but in order to comply with the rules of the London Stock Exchange, to which application will be made for an official quotation and settlement, £36,666 will be taken in full-paid shares and the balance in cash. The mines have been reported upon by Messrs. Bainbridge, Seymour & Rathbone, of London. The new company entered into possession on 1st January, and its representatives will meet in Buckingham

shortly. Among the principals are Mr. Couper, of Messrs. Couper, McCarnie & Co., London, and Mr. W. H. Williams, of New York.

The show recently discovered about quarter of a mile from the deep shaft of the Little Rapids mine, and on the same property, is yielding highly satisfactory results.

Templeton District.

At a meeting of shareholders held in Montreal recently, the Templeton and Blanche River Company decided to put in steam working plant and machinery on their property at an early date.

Wakefield.

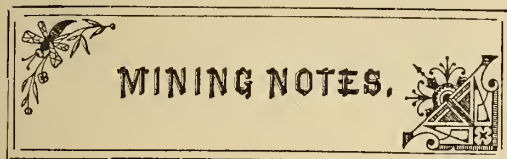
Mr. W. H. Fuller has suspended operations until spring opens, when work will be resumed on his property, lots 17 and 18, in the 2nd Range.

Perth District.

Captain R. C. Adams, Managing Director of the Anglo Canadian Phosphate Company, sailed for England early in the month to attend the annual meeting of the shareholders.

Kingston District.

Under the careful superintendence of Mr. Joseph Harris some 55 men are presently working on Captain Boyd Smith's Blessington mines. Four shafts, averaging from 70 to 100 feet, have been sunk since November and a large quantity of No. 1 ore has been mined. The prospects for next season are reported to be most encouraging.



Nova Scotia.

At the Coal Mines of Pictou County business continues good for this season of the year. The absence of snow enables the railways to handle their traffic and keep a fairly good supply of cars at the various collieries.

The Intercolonial Company keep their full complement of men working at their Drummond Mine, a fact which speaks well for their trade, as it has been found necessary for several winters past to reduce the number of workmen.

During the past month, the output from the Acadia has fallen off somewhat, not, however, through any scarcity of orders, but owing to the present lift being worked out faster than the new lift can be opened up. At the Albion Mines (also the property of the Acadia Co., Limited), slow but steady and sure progress is being made in the draining of the Ford Pit. The company purpose putting into their new slope a hydraulic pump, worked by an engine and transmitter on the surface.

At the Vale Colliery, the Acadia Co. has had the water pumped out of the 6th seam which has been closed for some time, and a few men are now at work. It is expected to be in full operation at an early date.

A discovery of coal is reported from Antigonish County, but particulars are not yet public.

FOR SALE OR LEASE

On Favorable Terms,

Valuable Phosphate Property,

On Rideau Lake, formerly known as

Marshall Property.

Address:

H. UNDERWOOD,

45 William St., New York.

The Joggins Coal Co. in Cumberland County, has orders booked for 25,000 tons of coal. There is a demand for experienced miners at this mine.

At the Gowrie Mines, Cape Breton County, boring operations have been going on, and at a short depth below their present workings an excellent seam of coal has been found.

The Lingan Mining Co. intend to re-open their Lingan and Barrasois Mines next year, and will build a railway to connect these mines with their Victoria Mine, where a new slope is to be sunk and the output increased twenty-five per cent. This will bring their output up to some 80,000 tons.

Mr. Joseph Hudson, son of Mr. Hudson, formerly General Manager of the Albion Mines, has been appointed Manager at Victoria.

Work at the various collieries has been very brisk during the past year, and the output notably at Springhill, Sydney Mines, Gowrie, Caledonia and Victoria has been larger than in former years. The total shipments are estimated to be over a million and a half tons, the total increase being over 150,000 tons. The workmen generally have had more regular employment, but it is much to be regretted that owing to keen competition there has been little, if any, improvement in prices. There has been no advance in wages although, owing to steadier employment, better average pay has been earned.

The *Colonial Standard* (Pictou) says: The output of Coal during 1887 has been the largest in the history of Nova Scotia, while the prices obtained have been higher than in any year since 1873.

At Springhill the output of coal has been nearly half a million tons, which it is contemplated to largely increase during the coming year. A new Slope, and also, it is said, a new shaft is to be sunk. The complaint of the miners here is that the pits are overcrowded with men. Everything has gone on fairly and smoothly between management and men during the year.

This company has purchased a large tract of Coal land at Cow Bay, Cape Breton. Operations are in progress to sink a shaft to a depth of some 350 feet, where it will tap the coal at a point in the centre of the basin where levels and cross-cuts will be entered.

At the Joggins Mines the shipments for 1887 reached 14,000 tons. This year, owing to the mine having connection with I.C.R., the output will be largely increased. A new company has lately taken hold who intend to push business. There are orders already in to keep the mine running for five months. More miners are wanted.

The Chignecto Colliery announce a fair increase in output over 1886.

Owing to the strike at the mines of the Halifax Company, work at the Drummond Colliery was brisker than usual during the first four months of the year. The management contemplate considerable extensions during this year. A number of miners are presently idle as they refuse work in places at wages offered.

The total output from the mines operated by the Acadia Company (Limited) shows a considerable falling off from former years, owing to the long strike. Notwithstanding this, however, there has only been a decrease of some 6,000 tons at Acadia, while the Albion actually shows an increase of 7,000. The decrease from Vale, however, reaches 37,000 tons.

The shipments from Caledonia Mines include 73,000 tons round, and 29,000 tons slack. A fine increase of 29,000 tons over '86.

From the Gowrie the shipments were very large, next in quantity to the Sydney Mines. Of round there were shipped 95,000 and of slack 23,000 tons. It is a coincidence that the increase at this mine is exactly the same as at Caledonia, viz., 29,000.

Sydney Mines still take front rank with a total of 147,000—of which 9,000 tons only were slack—an increase over '86 of 27,000 tons. Victoria Mines, also, show a handsome increase, the totals being 65,000 against 46,750 for '80. an increase of 19,000 tons.

The largest increase over '86 is shown in the shipments from Little Glace Bay. In '86 they only amounted to 28,000, whereas last year they footed up 76,000, a handsome increase of 47,000 odd tons.

The *Trades Journal*, Stellarton, gives the following comparative statement of output for the years 1886-87:

	'86	'87	In.
Spring Hill.....	389,476	442,000	53,000
Chignecto.....	7,527	12,742	5,215
Joggins.....	18,797	14,000	d. 4,797
Other Collieries....		500	

Pictou Co.

Drummond.....	121,779	143,530	21,751
Acadia.....	92,532	86,270	d. 6,262
Halifax.....	60,501	67,230	7,029
Vale.....	95,136	38,520	d. 56,616
Muir's Mine.....	est	2,500	

CAPE BRETON Co.

Bridgeport.....	12,000 est.	12,000	.....
Block House.....	3,000 est.	5,000	2,000
Caledonia.....	73,000	102,000	29,000
Gowrie.....	89,000	118,000	29,000
Glace Bay.....	29,000	76,000	47,000
Intercolonial.....	105,000	103,000	d. 2,000
Ontario.....	8,000 est.	8,000	.....
Reserve.....	83,500	81,500	d. 2,000
S. Mines.....	120,000	147,000	27,000
Victoria.....	46,750	65,000	18,250

Totals, by counties (round numbers.)

Cumberland.....	416,000	469,000	53,000
Pictou.....	369,000	338,000	d. 31,000
Cape Breton.....	588,000	717,000	129,000

Grand total for 1886: 1,373,000.

" " 1887: 1,524,000.

At the Albion Mines 9,000 tons of Coke were made and sold during the year.

The *Critic* is unofficially informed that the Lake Lode Gold Company, of which Mr. Sawyer, of Boston, is managing director, and Hon. L. L. Wadsworth, manager, has during the past year, realized net profits sufficient to pay for the mine. During this time, the mine has been thoroughly opened up and placed in a position to yield large profits during the coming year. The wise management have resisted the temptation to invest in expensive machinery, and the five stamp mill which was on the property when they purchased, has continued to do all their work. The Lake Lode Mine is only a fair sample of the value of our gold mines when they are properly worked.

The following are the official returns so far received at the Mines Office for the month of December, 1887:—

Mine.	District.	Tons	Ounces
		Crushed.	Gold.
Empress.....	Renfrew.....	236	104½
Oxford.....	Lake Catcha.....	69½	112
Moose River Co.....	Moose River.....	301	224
Dufferin Mining Co.....	Dars Hill.....	922	417

The last return from the Dufferin Mine gives 417 ounces from 922 tons crushed. This we believe says the *Critic* places it in the lead of gold producers for the year, although the Oxford must be close on its heels.

Since these notes were written the Albion collieries have again been wrecked by explosives and are on fire. These mines are the scene of the great explosion of 1880, when forty-five lives were lost. This time, fortunately, no lives were lost, but four men were badly injured, and fifteen men working in the Halifax pit when the fire was discovered had a hair breadth escape. The fire was discovered in the Halifax pit at 10 o'clock Saturday night, the 10th instant. Hardly had the men reached the surface when the mine exploded. Two explosions occurred on Sunday, the second one at 1.30 of tremendous force, wrecking the engine house, destroying the fan, burning all the hoisting gear and destroying all other buildings in connection with the mine. This explosion was so great as to be felt like an earthquake shock in the surrounding country for twelve miles distant. The mine is still on fire. It is supposed to have been communicated from the Cage pit, which has been on fire since the great disaster eight years ago.

E. GAUJOT,

MINING ENGINEER.

BELLEVILLE, ONT.

Quebec.

Messrs. Hodgins & Ostrum have made some excavations on the Creighton Iron lode on lot No. 2, Concession 7, Township of Clarendon.

Since our last issue Dr. Reed has taken out of his Antimony Mine, at South Ham, twenty tons of ore, said to average over 40 per cent., from a portion of the vein or measure five feet wide and eighteen feet long. The cost of taking the ore to Garthby Station, Quebec Central Railway, is \$2 per ton; freight, commission and insurance to Liverpool \$4 per ton; making a total cost of \$15.50 per ton, as follows:

Mining.....	\$7.50
Cartage, freight, etc.....	8.50
Total.....	\$15.50

The management state that the ore is worth £8.00 in England—giving a profit of \$24.00 on each ton to the mines.

We are indebted to Mr. Coste's report for the following comparative statement of Asbestos shipped up to 1886. These returns were obtained from the mines of the Eastern Townships:—

Years.	Tons.	Value.
1879.....	300	\$ 19,500
1880.....	380	24,700
1881.....	540	35,100
1882.....	810	52,650
1883.....	955	68,750
1884.....	1,141	75,097
1885.....	2,440½	142,441
1886.....	3,458½	206,251
Total.....	10,024½	\$624,489

Mr. Francis D. Taylor, M.E., Lennoxville, who has lately been engaged as one of the principals in the celebrated Tortilita case, leaves shortly on a business trip to Mexico.

The recent heavy snowfall has impeded traffic on many of the roads to the various mining camps, and, on this account, most of our provincial correspondence has been delayed until too late for publication this month.

Work is going on briskly at the Villeneuve Mica Mine, and the output of first-class mica continues good.

Ontario.

Latest advices from the Bristol district state that the iron mines are now fully equipped with the best machinery, and that the workings continue to prove the ore deposits to be immense and of great value. The miners are now drifting through solid ore over sixty feet wide. The two Calcining furnaces are turning out about one hundred tons of ore per day, and when desirable the quantity can be increased by four times this amount. About 10,000 or 12,000 tons of Calcined ores are expected to be hauled to Wyman's Station during the next two months. A road has been opened from the mines to the railway for this purpose, but nothing short of a railway or a tram line will adequately handle the immense quantity of ore that is being developed. The Bristol Iron Mining Company expect that either the P. P. J. Ry. or the C. P. R. will run in a spur track, and it is understood that either of these companies are favourably disposed to tap the mines in this way as soon as arrangements can be made. As hauling must necessarily be limited to the winter months, it is to be hoped that one or the other of these lines will give their attention to the matter before spring opens. The Bristol Iron Mining Company have effected many improvements in the locality; large numbers of men and teams are finding employment, and business generally has been much enlivened since the commencement of their operations in the district.

FOR SALE.

Asbestos Mines.

On Lots 27, 28 and 29, in Range A, of Colrairie, Megantic County, P. Q.

300 ACRES,

One Mile from Quebec Central Railway.

Free from Reserves or Royalties.

James Reed,

Reedsdale, Megantic, P. Q.

A discovery of Magnetic Iron Ore recently made on Lot 28, 4th Concession of Bedford Township, Frontenac County, promises to rival others in the well known Iron Mining District of the Kingston and Pembroke Railway. It is owned by Messrs. D. G. MacMartin and W. Davies of Perth who, preliminary to move extensive work in the spring, have contracted with a party of miners to take out one thousand tons this winter at one dollar per ton. They have had offers for the purchase of the ore from several parties in the United States who have received samples. A surface piece tested by Prof. Hoffman, of the Geological Survey Office, gave 62.98 metallic iron. The outcrop is very strong, and with the help of a dip-needle shows a width of from 30 to 150 feet which can be traced for about a quarter of a mile.

Messrs. Tough & Stobie, original discoverers of the Sudbury Gold properties, have formed a joint stock company with a capital of \$240,000 in which a number of prominent American capitalists are largely interested.

On lot 6, concession 9, North Burgess, a mica mine of much promise is being developed by Mr. D. G. MacMartin with very encouraging results. A shaft has been sunk 50 feet showing crystals of good size and quality all through the rock. At the south-west end 8 feet from bottom a drift has been driven in. The entire drift is a mass of mica, showing crystals of large size and of excellent quality. Mr. W. A. Allan, of Ottawa, is part proprietor with Mr. MacMartin.

A new discovery of gold is reported at the Richardson Mine, Township of Madoc.

Port Arthur District.

Since the date of our last issue the Rabbit Mountain Mine has been closed down just when everything had got into good working order with large improved machinery, and when a new mining captain of experience had taken it up enthusiastically.

The reasons assigned are an impending law suit instituted by one of the original owners and the necessity for better financial arrangements. This trying to make a mine pay as it goes along from the daily yield is a paltry way to operate an extensive mine.

Captain Hanson goes to the Transvaal gold fields with Mr. Furlonge—a strong team.

The Beaver Mine continues the even tenor of its way—ore coming out as fast as it can be economically handled.

The late manager entertained about forty of his friends from Port Arthur lately at the new hotel—the party driving out in sleighs, staying over night and returning the next day. In spite of the extraordinary deep snow and prevalent cold a most enjoyable time was spent.

Professor Eschweiler is making very good work at his pet "Badger" mine, a short distance south-west of the famous Beaver Mine. The Professor evidently knows what he is about, and has everything in good shape. Teams are engaged in hauling logs and preparing the site for his mill. The ore, we are told, looks very good indeed.

At Silver Mountain work is progressing with the full force of seventy-five men. In addition to the tunneling westward, both No. 3 Shaft and the winze in No. 1 Drift are going steadily down. The vein in No. 3 Shaft is seven feet wide, and the work in the winze shows a very good looking vein, three and a half feet in width, carrying silver combined with the usual blende and galena.

Crown Point Mine is progressing slowly but carefully under the supervision of Capt. Montgomery, who is hopeful as ever of making this mine take the lead. About fifteen feet more will bring him under the winze in the upper pit. Want of capital is the great drawback in working this promising property.

Besides the railroad commenced and constructed some ten miles from Port Arthur to the mining region another competitor, attracted by the outlook, has come to the front. It is called the "Ontario, Manitoba & Western Railway." It is projected to run through the mining region south of the C.P.R. and make direct for Winnipeg, crossing Lake of the Woods at the Narrows. The promoters expect to reduce the present travelled distance by about thirty miles and gain considerable on better grade. The Provinces of Ontario and Manitoba are expected to bonus this enterprise.

Mr. Peter D. McKeller, of Fort William, gave us a call during the month. He states that nothing will be done on the immense deposit of Magnetic Iron Ore owned by himself, his brother and Messrs. Graham, Hall & Co. for some little time yet. It is likely that a spur track, connecting the mines with the C.P.R. at English River, will be constructed, and Mr. McKellar entertains hopes that a better tariff will yet be obtained from the United States for the export of iron ores to that country. The property is some 240 acres in extent and is located adjacent to the Seine River.

Manitoba and North-West Territories.

Messrs. Sache and Wallis have begun mining coal on the claim of the former, near Edmonton. The seam is reported to be fully three feet thick and the coal hard and bright, approaching more closely to Anthracite than any other coal yet mined in the neighbourhood.

British Columbia.

The gold shipments for 1887 show a decrease from 1886 of \$174,118.81,

Bank of British Columbia.....	\$ 320,794 33
Bank of British North America.....	58,774 00
Garesche, Green & Co.....	19,356 19
Total for 1887.....	\$578,924 52
do do.....	753,043 33
Decrease.....	\$174,118 81

The placer mines of Williams, Lightning Grouse, Antler, Mosquito, Keithley, Horsefly, and the numerous other gold bearing creeks of Cariboo, not forgetting the Quesnelle and Fraser rivers, are still being worked, principally by means of hydraulic plant, and in some instances good pay is secured. Last season was peculiarly dry, and only a few weeks washing was had by most of the claims, and as a result the returns have been poor.

The following are the returns of gold yield in the Cariboo District for 1887:—

Barkerville 1st Jan. to 15th Nov.....	\$ 79,373
Lightning Creek, " ".....	30,700
Quesnellmouth, " ".....	61,000
Keithley Creek, " ".....	66,600
Desultory mining, " ".....	10,000
Mining from Nov. 1st to 31st Dec.....	10,000
Total.....	\$247,673
Yield of 1886.....	285,300
Decrease.....	\$ 80,627

At the Corbin and Kennedy claims in the Selkirks, several tunnels have been run in, extending from ten to fifty feet, and there are now about 300 tons of ore on the various dumps. Developments have proved permanent veins, some from two to four feet in width; others from six to nine feet. Numerous assays have been made giving averages between \$80 and \$100 per ton.

In the Stump Lake district a shaft 100 feet deep has been sunk on the Star. Assays give from \$20 to \$150 per ton.

In the same district the Nicola Mining company, of London, England, are estimated to have taken out from \$20,000 to \$30,000 of ore. On their property there is a 250 foot tunnel and over 300 feet of shafts.

In the Kootenay district the Otter Tail Gold and Silver Mining Company were fully prepared to commence work this season, they having erected a quartz mill, saw mill, and intend to erect a smelter, having made roads and tramways to their mines, and had likewise a quantity of ore on hand. Unfortunately, both for the company and the district, their property was destroyed by fire in June last—totally annihilating about \$60,000. The timber limits the company had secured are burnt up. This company owns four or five claims, and in some of their leads there is known to exist a large quantity of ore (silver) assaying from 30 to 55 oz. to the ton, close to the railway, and other parties own five or six claims adjacent thereto, one of them assaying 40 oz. to the ton. The leads vary in thickness from one to six feet, fully justifying the erection of a smelter in that locality.

In Upper Kootenay the season for those working in the placer or creek mines was pretty fair. On the old camping ground, Wild Horse Creek, Chinamen and others made a fair summer's work work hydraulicing, etc.

The total output of gold from the Cassiar district for 1887 is \$55,305; last year it was \$63,610—a considerable decrease. The miners are hopeful of striking better ground soon and Cassiar may again become a notable gold district.

During the year 198 placer claims and 26 mineral claims were recorded in the Lillooet section by the mining recorder, 22 of the latter being on Cayoosh Creek, three at Anderson Lake and one at Pemberton Portage. Five mineral claims were also located on Big Bar Creek.

The gold output is secured from the following sources:—

A. W. Smith, Lillooet.....	\$ 65,605
F. W. Foster, Clinton.....	20,432
E. Bell, Clinton.....	5,000
Other reliable sources.....	8,894
Total.....	\$100,022
Yield of 1886.....	132,000
Decrease.....	\$31,978

The apparent decrease is probably accounted for in the fact that Cayoosh Creek, the principal source of supply, is chiefly in the hands of Chinese, from whom no reliable returns can be learned. If the output could be learned it would probably foot to an amount greater than last year.

In North Kootenay the most important work of the past season has been that accomplished in the Illicillewaet mines, where about 250 men were altogether engaged in mining and prospecting. In the Big Bend about thirty men were engaged in placer mining in Carne's Creek, McEnloch Creek, French Creek and Smith's Creek. On the first-named creek no gold was secured on account of high water during the entire season. The Ophir Co.'s hydraulic claim on McEnloch Creek has been well opened out and good prospects of handsome returns were taken from the gravel. It will be spring time before it is possible to make a clean-up. On French Creek there are four companies at work running tunnels into the hill. The Victoria Co. are making good wages—from \$7 to \$10 to the man. The French Creek Tunnel Co., have recently got into good pay in their creek claim, they having sunk and drifted under the stream. The May Mining Co. and the "Three Dollar Co." are engaged in sinking. Smith's Creek is a newly discovered ground, the stream emptying into the Columbia from the west side. About half a dozen men have been working there during the summer, taking out small wages. Nothing has been accomplished in the way of developing the quartz ledges in the Big Bend.

The coal output for 1887 is considerably in excess of any previous year, being 410,573 tons. The nearest approach was in 1884, when 394,070 tons were mined. The output for 1887 would have been much greater but for the melancholy disaster at the Vancouver Colliery. The chief market for the coal is San Francisco, to which point 335,854 tons were shipped.

The output from the Wellington Mines (R. Dunsmuir & Sons) for the year ending 31st December last was 242,723 tons, with a total value at \$4 per ton at mine's mouth of \$966,892. 715 men were employed.

The output from the Vancouver Company's Mines has been 137,800 tons, of which 114,800 tons were shipped to San Francisco and other points while 20,050 was consumed locally. The unfortunate accident in May reduced the output from 16,039 tons in April to 4,351 in May.

It is thought that the total yield of coal from the East Wellington Mines has been in the vicinity of 30,000 tons.

The total from the province may be placed thus:—

R. Dunsmuir & Sons	Tons.
Vancouver Coal Company	242,723
East Wellington (probable)	137,850
Total.....	410,573

The Mines and Scenery of Algoma West

An interesting work on its industrial resources

— BY —

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Pneumonia!

A Scientific and Accurate Description of this Dreaded Blood Disorder.

"It is generally supposed that pneumonia is due to the accidental penetrating of specific microbes into the system, but the observations of M. Jaccoud show that the disease really results from the development, under favorable conditions, of microbic germs permanently present in the system. A chief condition of such development is a sudden chill, which explains the frequent coincidence of lung affections with abrupt changes of temperature." —Scientific American.

Another prominent (American) authority ascribes pneumonia to an excess of ozone, ozone being produced by passage of electricity in the air.

A distinguished American physician tells the New York Tribune that the prevalence of pneumonia indicates the universality of a uricacid condition of the Blood,—sudden chills always being characteristic effects of too much acid, of one sort and another.

The disease, as M. Jaccoud observes, is undoubtedly in the blood, but if in the form of permanent microbes or germs, these germs must be developed by the uricacid condition of the blood. Indeed, they cannot presumably exist in alkaline blood. Uricacid is the name for the waste matter of the system, which the kidneys, through evident though unsuspected impairment, have not been able to filter from the blood,—the filter being foul and stopped up in many of its little hair-like tubes.

The Tribune's authority says that pneumonia is a secondary disorder, the exposure and cold being simply the agents which develop the disease, already dormant in the system, because the kidneys have been but partially doing their duty. In short pneumonia is but an early indication of a bright's diseased condition. This impaired action may exist for years without the patient suspecting it because no pain will be felt in the kidneys or their vicinity, and often it can be detected only by chemical and microscopical examinations. Nearly 150 of the 740 deaths in New York City the first week in

a recent March, and in six weeks 781 deaths were caused by pneumonia alone.

If one has occasional chills and fever, a tendency to colds in the throat and lungs, rheumatic and neuralgic pains, extreme tired feelings, short breath and pleuritic stitches in the side, loss of appetite, back-ache, nervous unrest—scalding sensations or scant and discolored fluids, heart flutterings, sour stomach, distressed look, puffy eye sacs, hot and dry skin, loss of strength and virility, pneumonia is likely to strike him down any day, and his recovery will be doubtful.

These indications may not appear together, they may come, disappear and re-appear, for years, the person not realizing that they are nature's warnings of coming calamity.

The disease is very quick-acting and if the accompanying kidney disorder is very far advanced, recovery is impossible, for the kidneys give out entirely, and the patient is literally suffocated by water.

The only safeguard against pneumonia is to maintain a vigorous condition of the system and thus prevent attacks, by using whatever will radically and effectually restore full vitality to the kidneys, and for this there is nothing equal to Warner's safe cure. If the kidneys are not sound pneumonia cannot be prevented. This remedy is known to millions, used, probably, by hundreds of thousands all over the globe, and commended as a standard specific wherever known and used. It does not pretend to cure an attack of pneumonia, but it does remove the cause of, and prevent that disease if taken in time.

When a physician says his patient has either Bright's disease or pneumonia, he confesses his inability to cure, and in a measure he considers his responsibility ended. In many instances, indeed, persons are reported as dying of pneumonia, heart disease, apoplexy and convulsions, when the real cause of death, and so known by the physicians, is this kidney consumption. Thousands of people have it without knowing it, and perish of it because their physicians will not tell them the facts.

The same destiny awaits every one who will not exercise his judgment in such a matter and be true to himself, his family and to society.

*Transactions of the North of England Institute of Mining Engineers, vols. xxxvi., pp. 99-102.

†Annuaire de l'Association des Ingénieurs Sortis de l'Ecole de Liège, vol. vi., pp. 15-26; Minutes of the Proceedings of the Institution of Civil Engineers, vol. xc p. 537.

*Paper read before American Institute, Mining Engineers. †Figs. 1 to 6, inclusive, are from the catalogue of the Dickson Manufacturing Co., Scranton, Pa.

‡See tables on page 13.

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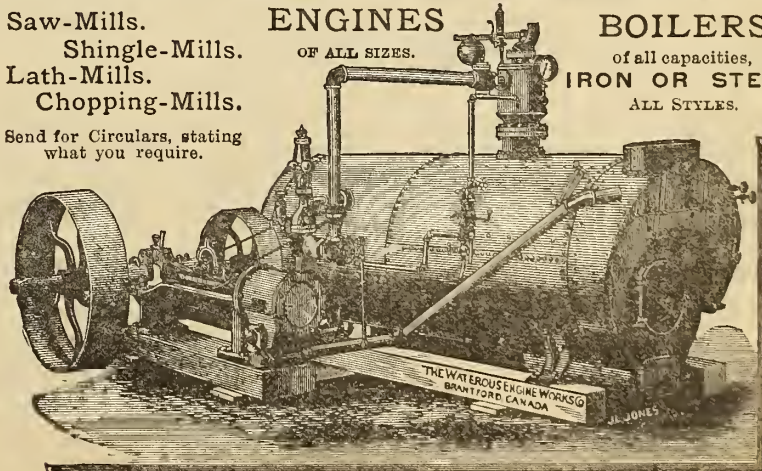
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3rd.—Nine acres of lot No. 28, in the 5th range, with water privileges thereto appertaining, being site of mill dam, etc., etc.

The property formerly belonged to the Montreal Plumbago Mining Company, and was worked successfully for several years, until the company's mill was destroyed by fire, but the mill dam remains almost uninjured, and there are on the property several houses, sheds, etc., built for various purposes when mining operations were carried out.

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upon the property are regarded as amongst the richest and most extensive in the Dominion. As to the quality of the Plumbago, it has been extensively used in the manufacture of crucibles, lubricating leads, stove polish, etc., etc., and given unbounded satisfaction. This is established by the experience of consumers, and by a certificate from the celebrated Battersea Crucible Works, London, England, a copy of which is open for inspection.

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has also been discovered in quantities.

The lands are in the Phosphate region, and recent prospecting has disclosed a rich and extensive deposit of this mineral. There are unrivalled facilities for transporting the ore to and from the mines by the Ottawa River and C. P. Railway. Distance from mines to Railway Station 6 miles. Good road.

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2nd. Sherbrooke Mine, part Lots 12 and 13,
R. 7 Township of Ascot..... 329 "
3rd. Belvidere Mine, part Lots 9 and 10, R.
9 and 10, R. 8 Ascot 292 "
4th. Mining Rights in same vicinity on..... 250 "

All of the above properties lie within $1\frac{1}{2}$ miles of the Village of Lennoxville, at the junction of the Grand Trunk, Canadian Pacific and Passumpsic Railways, and have been developed to a considerable extent, and veins opened 6 to 20 feet in width, yielding 3 to 5 per cent. of copper, also silver, and 35 to 40 per cent. of sulphur. These mines are only $2\frac{1}{2}$ to 3 miles distant from the City of Sherbrooke, and evidently are of the same class of ores found at Copelton, only four miles distant, owned and worked by the Orford Copper and Sulphur Company, and by Messrs. G. H. Nichols & Co., of New York, which have proved so remunerative.

TOWNSHIP OF ORFORD.

- 5th. Carbuncle Hill Mine, Lots 2 and 3 R. 14, and 2, 3, 4 R. 15, 718 acres. Same class of ore as is found in the Ascot properties above described, but yielding a higher percentage of copper.

TOWNSHIP OF CLEVELAND.

- 6th. St. Francis Mine, $\frac{1}{4}$ Lot 25 R. 12, 50 acres, with dwelling houses, smith's shop, ore sheds and office, large winding and pumping steam engine, with boiler, winding and pumping gear, and about forty fathoms Cornish lifting pumps complete, railway tracks, ladders, etc., situated three miles from Grand Trunk Railway. A considerable amount of mining work has been done at this mine. A well defined vein richly charged with vitreous purple and yellow sulphurets of copper traverse the entire length of the property, five feet in thickness, yielding 8 to 40 per cent. metallic copper.

TOWNSHIP OF GARTHBY.

- 7th. Fifty-six lots of land, 2,938 acres. This property for the most part is unexplored, but copper is found on the greater part of the property. On one of the lots a vein about twenty feet in width has been found. Samples of the ore have yielded as much as 22 per cent. of copper, being also rich in sulphur. Other samples of pyrites from the same property, free from copper, have yielded as high as 48 per cent. of sulphur. The only drawback to this property is in its distance from the railway, it being about four miles from Garthby Station, Quebec Central Railway. A new line is chartered, however, which, when built, will run directly through the property.

TOWNSHIP OF ACTON.

- 8th. The Acton Mine, 100 acres, with engine, boiler, pumps and appliances. Within three years after this mine was first opened it produced nearly \$500,000 worth of copper. It is situated about half a mile distant from the stations of the Grand Trunk and South Eastern Railways.

- 9th. Brome Mine, part Lots 2 and 3 R. 4, 50 acres.
10th. Bolton Mine, two miles from Eastman Station, Waterloo & Magog Railway, 400 acres.

The above properties formerly belonged to the Canadian Copper and Sulphur Company, and were acquired by the present owner at sheriff's sale, giving an indisputable title thereto.

The whole or any portion of the property will be sold at reasonable prices.

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Mining Regulations

TO GOVERN THE DISPOSAL OF

Mineral Lands other than Coal Lands, 1886.

THESE REGULATIONS shall be applicable to all Dominion Lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, iron or other mineral deposits of economic value, with the exception of coal.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein, either by surface or subterranean prospecting for mineral deposits, with a view to obtaining under the Regulations a mining location for the same, but no mining location or mining claim shall be granted until the discovery of the vein, lode or deposit of mineral or metal within the limits of the location or claim.

QUARTZ MINING.

A location for mining, except for iron on veins, lodes or ledges of quartz or other rock in place, shall not exceed forty acres in area. Its length shall not be more than three times its breadth and its surface boundary shall be four straight lines, the opposite sides of which shall be parallel, except where prior locations would prevent, in which case it may be of such a shape as may be approved of by the Superintendent of Mining.

Any person having discovered a mineral deposit may obtain a mining location therefor, in the manner set forth in the Regulations which provides for the character of the survey and the marks necessary to designate the location on the ground.

When the location has been marked conformably to the requirements of the Regulations, the claimant shall within sixty days thereafter, file with the local agent in the Dominion Land Office for the district in which the location is situated, a declaration or oath setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as aforesaid; and shall, along with such declaration, pay to the said agent an entry fee of FIVE DOLLARS. The agent's receipt for such fee will be the claimant's authority to enter into possession of the location applied for.

At any time before the expiration of FIVE years from the date of his obtaining the agent's receipt it shall be open to the claimant to purchase the location on filing with the local agent proof that he has expended not less than FIVE HUNDRED DOLLARS in actual mining operations on the same; but the claimant is required, before the expiration of each of the five years, to prove that he has performed not less than ONE HUNDRED DOLLARS' worth of labor during the year in the actual development of his claim, and at the same time obtain a renewal of his location receipt, for which he is required to pay a fee of FIVE DOLLARS.

The price to be paid for a mining location shall be at the rate of FIVE DOLLARS PER ACRE, cash, and the sum of FIFTY DOLLARS extra for the survey of the same.

No more than one mining location shall be granted to any individual claimant upon the same lode or vein.

IRON.

The Minister of the Interior may grant a location for the mining of iron, not exceeding 160 acres in area which shall be bounded by north and south and east and west lines astronomically, and its breadth shall equal its length. Provided that should any person making an application purporting to be for the purpose of

mining iron thus obtain, whether in good faith or fraudulently, possession of a valuable mineral deposit other than iron, his right in such deposit shall be restricted to the area prescribed by the Regulations for other minerals, and the rest of the location shall revert to the Crown for such disposition as the Minister may direct.

The regulations also provide for the manner in which land may be acquired for milling purposes, reduction works or other works incidental to mining operations.

Locations taken up prior to this date may, until the 1st of August, 1886, be re-marked and re-entered in conformity with the Regulations without payment of new fees in cases where no existing interests would thereby be prejudicially affected.

PLACER MINING.

The Regulations laid down in respect to quartz mining shall be applicable to placer mining as far as they relate to entries, entry fees, assignments, marking of localities, agents' receipts, and generally where they can be applied.

The nature and size of placer mining claims are provided for in the Regulations, including bar, dry, bench, creek or hill diggings, and the RIGHTS AND DUTIES OF MINERS are fully set forth.

The Regulations apply also to

BED-ROCK FLUMES, DRAINAGE OF MINES AND DITCHES.

The GENERAL PROVISIONS of the Regulations include the interpretation of expressions used therein; how disputes shall be heard and adjudicated upon; under what circumstances miners shall be entitled to absent themselves from their locations or diggings, etc., etc.

THE SCHEDULE OF MINING REGULATIONS

Contains the forms to be observed in the drawing up of all documents such as:— "Application and affidavit of discoverer of quartz mine." "Receipt for fee paid by applicant for mining location." "Receipt for fee on extension of time for purchase of a mining location." "Patent of a mining location." "Certificate of the assignment of a mining location." "Application for grant for placer mining and affidavit of applicant." "Grant for placer mining." "Certificate of the assignment of a placer mining claim." "Grant to a bed rock flume company." "Grant for drainage." "Grant of right to divert water and construct ditches."

Since the publication, in 1884, of the Mining Regulations to govern the disposal of Dominion Mineral Lands the same have been carefully and thoroughly revised with a view to ensure ample protection to the public interests, and at the same time to encourage the prospector and miner in order that the mineral resources may be made valuable by development.

COPIES OF THE REGULATIONS MAY BE OBTAINED UPON APPLICATION TO THE DEPARTMENT OF THE INTERIOR

A. M. BURGESS,

Deputy Minister of the Interior.

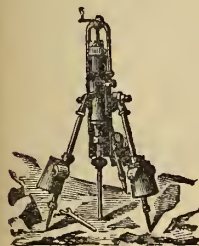
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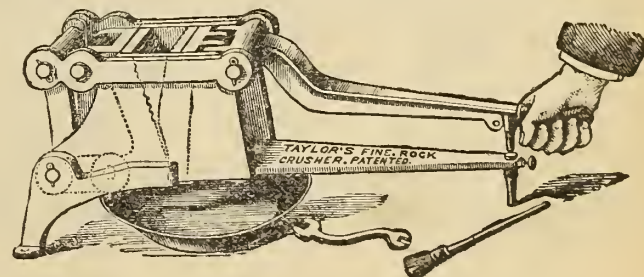
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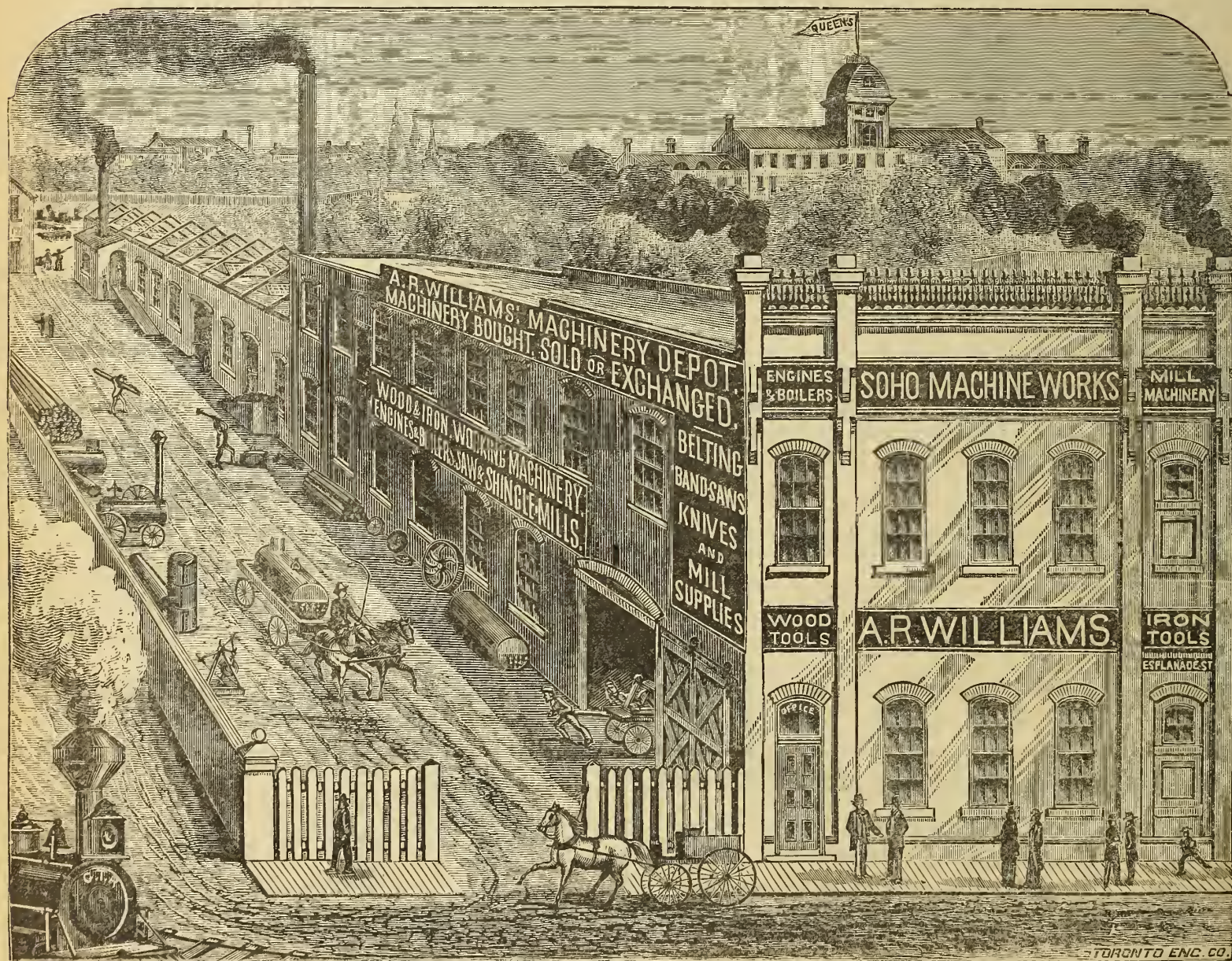
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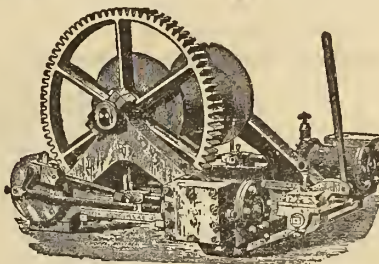
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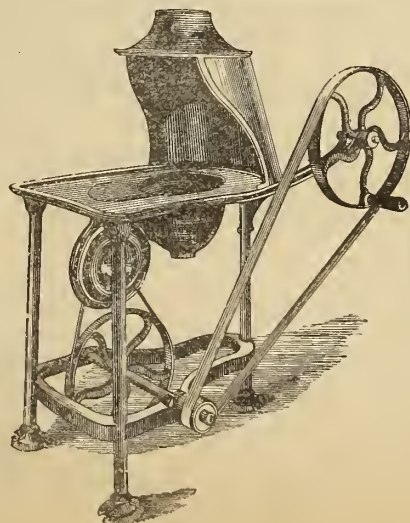
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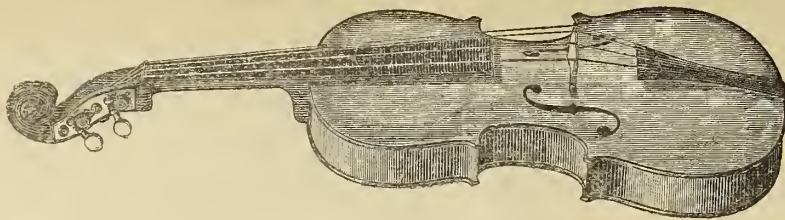
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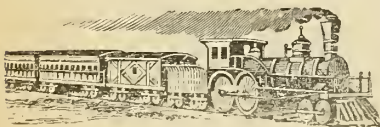


NOTICE RESPECTING PASSPORTS.

PERSONS requiring passports from the Canadian Government should make application to this Department for the same, such application to be accompanied by the sum of four dollars, in payment of the official fee upon passports as fixed by the Governor-in-Council.

G. POWELL,
Under Secretary of State.

OTTAWA, 19th Feb., 1886.



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Department of Inland Revenue.—An Act respecting Agricultural Fertilizers.

The public is hereby notified that the provisions of the Act respecting Agricultural Fertilizers came into force on the 1st of January 1886 and that all Fertilizers sold thereafter require to be sold subject to the conditions and restrictions therein contained—the main features of which are as follows:

The expression "fertilizer" means and includes all fertilizers which are sold at more than TEN DOLLARS per ton, and which contains ammonia, or its equivalent of nitrogen, or phosphoric acid.

Every manufacturer or importer of fertilizers for sale, shall, in the course of the month of January in each year, and before offering the same fertilizer for sale, transmit to the Minister of Inland Revenue, carriage paid, a sealed glass jar, containing at least two pounds of the fertilizer manufactured or imported by him, with the certificate of analysis of the same, together with an affidavit setting forth that each jar contains a fair average sample of the fertilizer manufactured or imported by him; and such sample shall be preserved by the Minister of Inland Revenue for the purpose of comparison with any sample of fertilizer which is obtained in the course of the twelve months then next ensuing from such manufacturer or importer, or collected under the provisions of the Adulteration Act, or is transmitted to the chief analyst for analysis.

If the fertilizer is put up in packages, every such package intended for sale or distribution within Canada shall have the manufacturer's certificate of analysis placed upon or securely attached to each package by the manufacturer; if the fertilizer is in bags it shall be distinctly stamped or printed upon each bag; if it is in barrels, it shall be either branded, stamped or printed upon the head of each barrel or distinctly printed upon good paper and securely pasted upon the head of each barrel, or upon a tag securely attached to the head of each barrel; if it is in bulk, the manufacturer's certificate shall be produced and a copy given to each purchaser.

No fertilizer shall be sold or offered or exposed for sale unless a certificate of analysis and sample of the same shall

have been transmitted to the Minister of Inland Revenue and the provisions of the foregoing sub-section have been complied with.

Every person who sells or offers or exposes for sale any fertilizer, in respect of which the provisions of this Act have not been complied with—or who permits a certificate of analysis to be attached to any package, bag or barrel of such fertilizer, or to be produced to the inspectors to accompany the bill of inspection of such inspector, stating that the fertilizer contains a larger percentage of the constituents mentioned in sub-section No. 11 of the Act than is contained therein—or who sells, offers or exposes for sale any fertilizer purporting to have been inspected, and which does not contain the percentage of constituents mentioned in the next preceding section—or who sells or offers or exposes for sale any fertilizer which does not contain the percentage of constituents mentioned in the manufacturer's certificate accompanying the same, shall be liable in each case to a penalty not exceeding fifty dollars for the first offence, and for each subsequent offence to a penalty not exceeding one hundred dollars. Provided always that deficiency of one per centum of the ammonia, or its equivalent of nitrogen, or of the phosphoric acid, claimed to be contained, shall not be considered as evidence of fraudulent intent.

The Act passed in the forty-seventh year of Her Majesty's reign, chapter thirty-seven and entitled, "An Act to prevent fraud in the manufacture and sale of agricultural fertilizers," is by this Act repealed, except in regard to any offence committed against it or any prosecution or other act commenced and not concluded or completed, and any payment of money due in respect of any provision thereof.

A copy of the Act may be obtained upon application to the Department of Inland Revenue, as well as a copy of a Bulletin which it is proposed to issue in April, 1888, concerning the fertilizers

E. MIALL,
Commissioner.

15th Dec., 1887.

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The Canadian Mining Review

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OTTAWA.The REVIEW is published purely in the interests of the Canadian
Mining Industry, and its publishers will be thankful for any
encouragement they may receive from those interested in its speedy
development.Visitors from the mining districts, as well as others interested in
Canadian Mineral Lands, are cordially invited to call at our office.
Mining news and reports of new discoveries of mineral deposits
are solicited.All matter for publication in the REVIEW should be received at
the offices not later than the 19th of the month.Address all correspondence, &c., to the Manager of THE
CANADIAN MINING REVIEW, Ottawa.**NOTE.**—Owing to stress of matter we are compelled
to hold over several communications of interest until
next issue.**Natural Gas.**

Within the last two years natural gas has become a subject of great practical interest to Canada. In this cold climate the question of fuel for heating and of light for our dwellings, shops, and factories, during the long nights of winter, is one of the first importance among other necessities of life. With the exception of Nova Scotia and British Columbia, at the extreme east and west, available coal is not found in any of the provinces; for, although a thin seam of coal does exist in New Brunswick it is scarcely worth mentioning, and the people of Manitoba prefer importing coal to using the inferior lignite which is found in the south-west corner of their province. Under these circumstances, the possibility of finding, in many places, a cheaper and better substitute in the form of natural gas, may be hailed as a boon of no small importance. This therefore unexpected

source of heat and light has been largely developed in some parts of the United States, especially in Pennsylvania, Ohio and Indiana; and the question is naturally asked, have we anything of the sort in Canada? Lately this question has become of special interest to the citizens of Ottawa. Geologists tell us that we have here the same formation which yields the apparently inexhaustible supplies of gas in Ohio, and that its thickness and character are such as to lead us to expect that it may produce this substance in large quantities. But it is not a question of production alone. The gas must have also been retained in the strata through long ages in order that it may now be available. This again necessitates the existence of the natural reservoirs in which to store it; and it seems that these are only to be looked for under anticlinal arches and domes. The anticlinal theory, in reference to the accumulation of petroleum and gas, was first propounded by our own geologists, Logan and Hunt, in 1860, and the truth of this theory has been fully established. Indeed the physical laws governing matter make it impossible to be otherwise. The existence of available supplies of high pressure gas is therefore a question of geological structure as well as of the presence of the gas-producing strata. And both of these conditions would even prove unavailing without a sufficient cover to retain the gas; so that the concurrence of all three of these conditions is necessary to obtaining a supply of this valuable substance. Other conditions may also be mentioned, such as that the anticlinal must be an extensive one, otherwise the quantity of the gas and its pressure will be small in proportion.

We see, therefore, that although the rocks under the City of Ottawa, for example, may have been producing gas through a long geological period, it has all escaped as soon as formed, owing to the position of the strata and the want of a cover. This will naturally be the case also everywhere near the outcropping edges of the Trenton formation. The Utica shale is scarcely of the character necessary to hold down gas under high pressure. What is wanted is a more plastic and impervious formation.

We see that it is proposed to bring "gas experts" here to point out the proper places to bore. It is, however, not a matter for "gas experts" to deal with, but purely a geological question, and we have surely talent enough nearer home to advise us in this matter. We will no doubt find plenty of wiseacres to tell us there is no use to look for natural gas within an available distance of Ottawa. In the United States natural gas is brought 20, 30 and even 40 miles. The burden of proof will rest with those who deny the utility of incurring the small expenditure necessary to try, provided the most likely places be pointed out by our geologists.

The city council of Ottawa has acted rashly in granting equal rights to two companies to lay pipes, etc., in our streets. A gentleman con-

nected with one of them has suggested a way out of the difficulty by the city itself laying the pipes and allowing both of the rival companies to supply the gas simultaneously. But he should remember that *pressure* will have something to do with this arrangement. One company might not only be supplying all the gas, but be actually pushing it down the other company's well, which would become a mere safety valve to the other. Our city fathers must solve this problem, which has been of their own creating, in some other manner, and place no unnecessary barrier in the way of the citizens enjoying the gift which nature has apparently placed near our doors.

Production of Salt and Silver.

In the brief review last month of Mr. Coste's Statistical Report on Minerals in Canada, we were only able, from the limited space at our command, to glance at the general features of the work, without commenting at any length on several of its articles which are well worthy of special notice. Mr. Coste was materially aided in the preparation of this work by Mr. E. D. Ingall, R.S.M., to whom in large measure the inception of the undertaking is really due, and to whose assistance Mr. Coste gracefully alludes in his opening paragraph.

The article on salt, by Mr. Ingall, is especially worthy of notice, as it gives a concise history of the salt works of Canada from the start, and contains much valuable information respecting the process by which salt is manufactured from the brine. The causes which tend to depress this industry, and so limit the production of native salt, appear to be principally the competition of English salt coming into Canada duty free, and with discriminating freight rates in its favour. The Canadian demand is limited, whilst that of the States is large and rapidly increasing. The subject was treated very discursively in the Geological Survey Report of 1876-7 by Dr. Sterry Hunt, since which date we believe no official data have been given to the public until Mr. Ingall took it in hand. He states that the large area in Ontario underlain by the salt, would enable the Goderich district to supply all the salt demand of the Dominion for years to come. As the fish trade of the lakes increases, which every succeeding year shews to be the case, the demand for salt for curing purposes will increase likewise, and its production on the spot must materially tend to the ultimate use of the native product over the imported article. The tables compiled by Mr. Ingall and inserted at the close of his article will be found very useful for reference.

Another exceedingly well written article from Mr. Ingall's pen is that on Silver. From it we learn in as concise a manner as is compatible with a statistical abstract, the exports of this precious metal since 1873. Owing to the interest now attaching to the silver mining operations in the Port Arthur district, which

we believe will be very largely extended this year, the article we allude to will doubtless be frequently consulted by those interested in silver mining. A remarkable fact is noticed by Mr. Ingall, namely, that there is a vast difference between the official records of silver exported from 1871 to 1875, and the published returns of silver produced. Now, as Canada is not a country which consumes much silver in its unmanufactured condition, this discrepancy is not readily accountable. This fact alone shows of what value Mr. Coste's work will be from year to year, for reference and for information, which may be looked upon as official. Silver mining bids fair to become one of the most valuable of Canadian mining industries.

Mining Around Port Arthur.

A correspondent resident at Port Arthur, and who, although not personally interested in any of the mines there, is a close observer of mining operations, and everything pertaining thereto, sends us the following remarks relative to the work carried on last year (1887). His observations are reliable.

"Mining operations have been carried on very energetically during the year. Upwards of ten thousand acres of mineral lands were purchased from the Ontario Government during the past twelve months, principally iron lands, explorers having traced the rich iron deposit of northern Minnesota into Canadian territory. Active steps will be taken in the early spring to develop these and other properties which will necessitate the expenditure of a large amount of capital and give employment to a great number of men.

"The most phenomenal success in the district is the 'Beaver' silver mine, which, during three months last summer, returned to its owners all the money (about \$200,000) previously invested in working it. Nearly all the other properties on which work has been progressing continue to improve, and it is not improbable that within the next year half a dozen mines may be working quite as successfully as the 'Beaver.'

"The completion of the Port Arthur, Duluth and Western Railway from Port Arthur to the international boundary will greatly facilitate mining operations, not only in the iron but in the silver and gold districts contiguous to this route. Ten miles have been graded this fall, and the timber and ties necessary for the completion of the first twenty miles are on the ground, and it is expected that forty miles will be in operation by 1st July next. This road will also tap a large area of pine timber lands near the boundary which is at present the property of the Provincial Government, and open up a large tract of good agricultural land."

The Nanaimo Explosion.

The details of the terrible disaster at the Wellington Colliery, with its melancholy list of dead, cannot fail to awaken in the hearts of our readers feelings of profound sympathy for the unfortunate wives and families so suddenly bereaved; much suffering must necessarily exist, and we are confident that as soon as an appeal is made for pecuniary assistance the

public will respond with a ready and liberal hand.

The mine has always been regarded as the best arranged and ventilated on the island, and practical men state that its equipment could not have been better. Only a few days before, in accordance with regulations, it had been thoroughly inspected by practical men who reported it to be in the best possible condition. Until the result of the Enquiry has been made known the cause of the deplorable occurrence can only be conjectured. Mr. E. G. Prior, M. P., who inspected the mine shortly after the explosion, examined the faces of all the levels and stalls, and is firmly of opinion that the primary cause of the explosion was a blown-out shot in the face of the main east level. Everything goes to prove that the explosion started from there. All the timbers are blown from that point, and there is a thick coating of soot on that side of all the rock and timbers. A miner's powder canister capable of holding about four pounds, was found within twenty-one feet of the blown-out shot, and the shot itself points in a direct line for the can. The contents of this can had exploded. Some dozen other cans, more or less, full of powder were found in different parts of the levels, headings, &c., where the explosion had passed through, the contents of which had not exploded. Mr. Prior is quite confident that gas played no part in the explosion, but that the latter was started by a blown-out shot, which discharged the powder-can and ignited the coal dust. The mine though dry, is by no means dusty, and is one which, under ordinary circumstances, he would consider perfectly safe from explosion by coal dust.

We are glad to see that the miners are insisting upon practical miners only being allowed to sit on the Enquiry. We need hardly add that in the interests of the mining community a searching investigation must be made with a view to adopting preventative measures for the future.

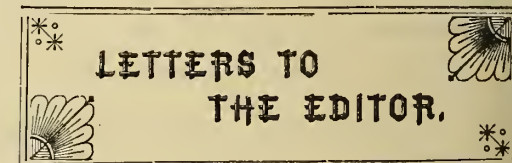
Prospecting Licenses for Gold.

In striking contrast to the shameful apathy and negligence of the Provinces of Ontario and Quebec, the Provincial Legislature of Nova Scotia has always had the true interests of the mining community at heart, and by many wise enactments has done much to foster and encourage the development of the resources of the province. This is shewn by the rapid progress and prosperity of the industry, and by the large and increasing revenue annually derived from it by the local treasury. There is, however, still room for improvement, particularly in the present system of granting Prospecting Licenses for Gold, as may be gathered from the following practical remarks made by the Commissioner of Mines:

"These licenses are granted for six months, with an option of renewal. Their location and renewal has led to much confusion and trouble in new districts, as they

are frequently selected almost at random for speculative purposes, and mistakes arise when portions of them are selected for leasing, etc. In view also of the large extent of ground covered by leases which are practically unforfeitable, the following suggestion may be worth consideration. This is briefly that the system of granting prospecting licenses be abolished, that leases be issued for any term decided on, say 20 or 30 years, to be held by labour or annual rental. That on the non-performance of the labour or non-payment of the rental the lease be thereby forfeited without recourse to any court of investigation or forfeiture. To give an opportunity to those who may be desirous of prospecting, the cost of the lease for the first year could be made the same as that of a prospecting license of equal extent, but if the lessee desired to continue his operations he should then before the close of the first year secure the continuation of the lease for another year by payment of the permanent rental, and so on. An arrangement similar to this would, on the basis of a small annual rental, of say \$1.00 an area, prove a boon to the prospector, for under the present arrangement he would pay for a prospecting license of one area for 12 months, 75 cents, then for a lease \$2.00, in all \$2.75. This secures him the ground for say two years; if he did not work, his lease would be liable to forfeiture. Under the proposed arrangement the same sum would secure to him his area for three years. This arrangement would also give the Province a revenue from the numerous unworked leases now hindering exploration and probable discovery of valuable ground in all our mining districts, stimulate the holders to work, and give a security and fixity of title to leases, which is desirable in the interests of investors. Provision could be made to protect properties on which any temporary cessation of work was necessary, or which were in litigation, and to prevent injustice to any prior occupant who had made any bona fide expenditure."

We commend these able suggestions not only to the careful consideration of the legislators of Nova Scotia but also to the local governments throughout the country, where they are equally applicable.



We invite Correspondence upon matters consistent with the character of the REVIEW.

Be as brief as possible. The writers name in all cases required as a proof of good faith.

One dozen copies of the issue containing his communication will be mailed free to any correspondent on request.

We do not hold ourselves in any way responsible for the opinions expressed in this section of the REVIEW.

The Dominion Mining Laws.

OTTAWA, 8th January, 1888.

The Editor

THE CANADIAN MINING REVIEW.

SIR,—I have read with a good deal of interest Mr. Nettle's letter to you, dated the 20th ultimo. It is quite clear that Mr. Nettle has not read the Canadian Mining Regulations for himself, but has accepted as true the construction placed upon them by somebody who has had an interest in misrepresenting them. There is not a solitary provision in these Regulations which would justify Mr. Nettle's denunciation of speculative companies and land sharks, etc. There is no objection, now that Mr. Nettle is apparently an American citizen, to his praise of the laws of his own country, but I take the opportunity of saying that it would puzzle him to produce a tittle of evidence in support of his strictures on the Canadian Mining Laws which are contained in the letter addressed to your paper. Mr. Nettle condemns the \$5 entry fee imposed under the Canadian Mining Regulations, but conveniently forgets to mention that there are free miners' licenses, poll-taxes, fees to the Mining Recorder, and other specious modes of levying upon the prospector resorted to in every State and Territory of the American

Union, which find no counterpart anywhere within the Canadian North-West, to which the Canadian Mining Regulations more particularly refer.

I am, yours respectfully,
CANADIAN.

Our Undeveloped Resources.

OTTAWA, 20th Feb., 1888.

The Editor

THE CANADIAN MINING REVIEW:

SIR,—I am very glad to see that the question of the development of Canada's mineral resources is being so well ventilated at present, and hope that the agitation now going on may lead to some really practical steps being taken in this direction.

That there is a great necessity for something to be done has been patent for years to all those who know anything of the development of mining districts in other countries, but, unfortunately, the mining community form too small a portion of the population to make their voice heard, and their want of any organization whose function it would be to champion their rights, still further lessens their weight in the legislative councils of the land. Mr. A. C. Lawson, of our Survey, in an article recently contributed to the *Toronto World*, has very ably represented these views.

Unfortunately, it is very difficult to convince the rest of the community of the necessity for these steps, and one can well understand how hard it is for those only familiar with the development of the farming and lumbering resources of the country to realise that the mineral resources require any different treatment.

The fact remains nevertheless, and the principles which have been found successful elsewhere will have to be followed before we can do anything with our mining districts, beyond having spasmodic "booms" at long intervals which never end in anything useful, and do an immense amount of harm.

The principles to which I refer are those of encouraging the actual prospector and of making the holding of mineral lands conditional to working.

In these and the following remarks regarding the mining laws I am referring more particularly to those provinces with which I am acquainted, viz: Ontario and Quebec.

Now, the laws of these provinces do not attain these two ends, but, on the contrary, bring about results which will eventually prove most disastrous, and this for the reason that they offer every facility to the man with spare funds to buy up all the land upon purely speculative grounds before anything has been discovered upon it.

These results may be best illustrated by an example. A prospector starts out into the bush having expended all his savings in the purchase of the necessary outfit to enable him to carry on his campaign long enough to have a chance to find something for his exertions. He goes out into the bush far from the haunts of civilized man, and after going through the toils and dangers of his arduous calling he may be lucky enough to find indications of some good vein or deposit of mineral. He cannot now, as he should be able to do, stop and explore his find to see if it is going to be worth while for him to take it up, for unless he is very prompt he may find that someone has "got on his tracks," and surveyed and acquired the land before him; so he has to take his

chances on this point; he therefore retraces his steps to the nearest town, often a long and tedious journey by trail and water course, and there, being out of funds, must make the best terms he can with the man of spare cash in order to enable him to acquire the land and pay the expenses of taking a surveyor and party out into the wilds. Then comes the rush, not of prospectors, but of speculators, who promptly take up land all round and thus immediately put a stop to all further explorations in the vicinity, which is the very spot where both experience and common sense would lead us to look for other veins or deposits.

Even if he is able to finance it himself, by the time he has acquired the necessary length of the vein all his spare cash will have been exhausted and he will have to defer testing his find till the next season, meanwhile securing the necessary funds to do so by saving out of wages earned at other employment.

Then, when after all this, he is in a position to further test his vein he may find that it does not develop as his first and necessarily cursory examination led him to believe, and that instead of a prize he has drawn a blank, so he has to begin all over again, or, more likely, he abandons exploring under such disheartening circumstances and goes where the conditions are more favourable.

This, sir, is no imagined case, but an actual and constant occurrence with the lamentable result that the resources of the country are passing rapidly out of the grasp of the Government who only can control the development of the resources of the country for the general good of the community and for the furtherance of the growth of the nation.

Thus we find in our mining regions whole areas tied up which in size would equal any of the mining districts of England; and, needless to say, after the first discoveries which have led to this state of things exploration ceases; for who wants to make discoveries on other people's land?

Occasionally, of course, the owners of these lands expend money in exploring them, but this is exceptional; and we find most of the property is held by parties living far from the district, whose resources and energies are expended in other pursuits and who regard their mineral locations simply as they would a ticket in a lottery which may by some chance suddenly bring them a fortune.

Besides these there are many other ways in which the present law entails hardship upon the prospector, but space will not permit me to further illustrate them here, suffice it to say that the final result is that where we should have a hundred explorers searching for the valuable mineral deposits, which undoubtedly exist in our mining regions, we now have one; and that the small capitalist, instead of fulfilling his proper part in coming to help the prospector to do the preliminary testing of deposits already found, becomes simply a speculator in mineral lands; thereby not only failing to perform his proper function, but by coming in too soon in the economic machinery actually prevents the working of the whole train and blocks discovery at the outset.

So much then for the effect of the prevalence of erroneous conception of the conditions necessary for the development of mining districts, and we find similar causes militating against the successful development of individual mines.

It is very common to find parties starting to open up mines with an altogether too limited idea of how much expenditure is required before a promising prospect can be put on the footing of

a paying mine. They think that an investment of a few thousand dollars ought to ensure continuous returns of handsome profits; and if their expectations are not realised, which, of course, they cannot be, except in very rare cases, they either give up an effort which, if carried out pluckily, would have most likely turned out very profitable in the end, or else they continue it in a half-hearted way which of itself courts failure, and is very disheartening to all engaged and only delays the final failure.

Instances have frequently come under my notice where, as we say, the "eyes have been picked out" of the mine, and the company, instead of pushing on the underground development work vigorously so as to find and explore other ore bodies in their vein, have confined themselves to work in and around the first found body, and when that has all been exhausted have not the capital or pluck to do all the "dead work" necessary to put the mine again on a paying basis which should have been done in the first instance. The result is another abandoned mine about which it is almost impossible to get reliable information, so that in the absence of any evidence to the contrary, it is taken for granted that it was properly and thoroughly tested, and another failure is recorded, doing infinite damage to the reputation of the district.

In thus pointing out some of the reasons for the backwardness of the mining industry of the country, I am not, of course, appealing to the mining community, as these things are already too well known to and deplored by the profession, but hope that I may be contributing somewhat to a better realisation of the case by the outside public which end must be attained before we can get anything done.

I am, Sir, yours, etc.,

ELFRIC DREW INGALL,

(Mining Geologist of Geological Survey of Canada. Associate Royal School of Mines of England.)

Coal in Ontario.

OTTAWA, February 14th, 1888.

The Editor

THE CANADIAN MINING REVIEW:

SIR,—In the January issue of the CANADIAN MINING REVIEW, I was quite surprised to see a correspondence from Westville, N. S., from the pen of "Briton," in which that gentleman states that "during a brief sojourn in Ottawa" he was "led to believe that coal will be sooner or later found within 100 miles of that city." This important statement is then followed at the close of his communication by three questions which practically resolve themselves into two: Does the Carboniferous system in geology occur in Ontario? or in other words: are the coal measures found in the series of geological formations of Ontario?

With regard to the third question which "Briton" puts, I have only to refer him to reports on that subject where 'natural gas' has been obtained and utilized for years past, and add that an analysis of the 'gas' at East River, Pictou, N.S., would have to be made before any comparison could be instituted.

Taking first, the country surrounding Ottawa, and examining its geological history closely, i.e., taking into account the lithology, stratigraphy, and particularly the palæontology of the rock formations occurring within the limits indicated and even far beyond that, it is found to be clearly divisible into three great classes each of

which belong to and are referable to well-known and easily recognized *systems* in geology, as follows:—

1. The post-tertiary or post-pliocene formations, consisting of sands, marls, gravels, clays, &c., most of which were deposited in the geological epoch immediately preceding the advent of civilised man in this part of North America and in which no trace of coal can be found, so that this geological series may properly be discarded. 2. Then comes the Cambro-Silurian or Ordovician formations. These are likewise well-known and extensively developed in the Ottawa region. They are all of marine origin and were deposited along the shores or at the bottom of a great sea or ocean without interruptions or breaks in time of any kind, including all the formations from the Hudson River down to the Potsdam, viz., (*in descending order*) Hudson River, Utica, Trenton, Black River, Chazy, Calceiferous, Potsdam. The thousands of localities where these geological formations are well known to crop out to the surface of the ground in this neighbourhood and exhibit their strata along the line of strike, have afforded geologists abundance of material for sections in which the exact sequence of the beds may be obtained, from the heavy quartzite conglomerates of the Potsdam formation resting unconformably on the contorted strata of the *third* or Laurentian system, followed upwards by shaly and heavy bedded sandstones which pass gradually into the Calceiferous sandrock of the next formation, to the highly bituminous and fossiliferous strata of the Utica formation, which themselves pass upwards into the calcareo-arenaceous shales of the Hudson River formation.

The numerous rivers and streams of the Ottawa Palaeozoic Basin which run through and over the strata, exhibit the various formations above mentioned so well that a continuous series indicating the proper succession of all the beds of the rock constituting them, has been fairly obtained and known not to present any trace of a coal seam whatever throughout the whole area and along any of the lines of outcrop. The lithological and stratigraphical characters of the whole strata as known are therefore decidedly against the occurrence of coal in the neighbourhood of Ottawa.

But the palaeontological argument is by far the strongest in this question of the existence of coal in Quebec or Ontario? A very brief examination of the fossil remains which are so well preserved and so abundant in the measures about Ottawa, together with a slight knowledge of the flora and fauna of the coal period, suffice to convince even the most sanguine exponent of the existence of carboniferous rocks or productive coal measures about Ottawa, (after instituting a comparison) that the latter series of formations are not the ones occurring here at all. When the sedimentary formations of Ottawa were laid down, the carboniferous age, characterized by the occurrence of a luxuriant vegetation, consisting of gigantic tree-ferns and other low orders of plants, chiefly acrogens, was not even predicated as yet; in fact, the highest types of animal life which are known to have existed in those old Ordovician times were of a very inferior order to those of the coal period, in which "air breathers" are known to have existed in great abundance. If the carboniferous or coal-bearing rocks occurred in the Ottawa Valley or in Ontario and Quebec (where the arguments above referred to apply equally well), then the accompanying flora and fauna would be present which characterises that period in the earth's history all the world over, but neither do the rock formations of Ottawa contain coal

nor do the fossil remains entombed in their strata point to the occurrence of that extensive and useful series in this part of Canada.

The statement which your correspondent then makes regarding the strata which overlie and underlie the coal-bearing rocks of Canada, as well as those which overlie at least fifty collieries in England, viz.: that they are the same as those which we have at Ottawa, cannot at all be entertained, except from a purely general lithological standpoint. The occurrence of shaly strata, associated with limestones and sandstones, occur in nearly every system of the geological record, so that these are, by themselves, not sufficient data upon which to go; but the evidence afforded by the fossil remains, telling the exact time in the history of our planet when the rocks in which they are entombed were laid, is most conclusive and final.

Now, Sir, if the knowledge of the geological formations of Ottawa and its environs is such as to point conclusively to the fact that the carboniferous or coal-bearing rocks do not occur in this district—your present correspondent would like to know if it is not better in the light of all to "deter capitalists" from investing and sinking funds which will be entirely wasted and productive of no other results than those which have attended the labours of many who have already bored for coal at Whithy, at Levis and other parts of Canada, all of whom have learned by experience that the parties who carry on these boring operations are the sole individuals who profit thereby, and that the strata bored are of a very different nature from the coal-bearing rocks of Canada and elsewhere which are easily recognized wherever they occur.

I am, yours respectfully,

NORMAN.

The Problem Solved.

Apropos of the natural gas excitement at Ottawa, the following from the pen of a correspondent to the *North Hastings Review* will be read with relish:—

"I beg to advance the theory that the natural gas contributed by 211 Parliamentary representatives has been for 20 years absorbed by these porous rocks and now forms a vast reservoir which the Wallace gas company is about to tap and supply through pipes to dwellings for heat and fuel. This I submit is a plausible explanation of the source of supply, as from its heavy quality the parliamentary gas would naturally sink. The trouble will be to separate the stuff in the reservoir, for should Sir John's food be cooked with Mr. Blake's gas, it would give him the mollygrubs, and should they heat Mr. Laurier's room with Sir John's gas, the member from Quebec would be asphyxiated. This utilizing of natural gas in Ottawa is a great scheme of public economy."

MISCELLANY.

Decomposition of Chrome Iron Ore.—

C. Donath* decomposes chrome iron ore by mixing the finely powdered ore with five times its weight of barium dioxide, and heating it for half an hour in a porcelain crucible over a Bunsen burner. A greenish yellow mass is obtained, which is soluble in cold water acidulated with hydrochloric acid, the solution containing all the chromium in the form of chromic acid.

Curious if True.—In South Africa coal is reported to have been found among gold reefs. An enterprising prospector went to the *Digger News* and said, "I had both a

disappointment and success yesterday. I was looking for the main reef out near Booksburg, and had sunk a shaft 90 feet deep, when I came upon this bally stuff" (handing out a few samples of coal). Whoever would have thought of finding gold between the reefs?

A Nova Scotia Miner's Heroic Act.—

About eight o'clock on Wednesday morning, 18th ult., the men employed about the pit mouth and buildings of the British and Colonial Land Association were started by a cry, "Run for your lives the dynamite is on fire?" When the men had fled to a place of safety, W. N. Reseigh, agent of the mine, came back and looked into the building whence the alarm had come. He noticed flames issuing from a box in which one of the contractors had dynamite fuse, detonators, etc., stored. Knowing there were men working in the shaft a few feet distant he determined to save them at any risk. He ran into another building, secured a bucket of water, and at the eminent risk of his life extinguished the flames and saved the lives of the men. He was not a moment too soon. A coil of fuse in the box was completely burned and a tin box containing detonators was scorched and blackened on all sides. The dynamite, only a few inches away, had not yet taken fire. Had he been a minute later the hero of the occurrence would not be alive to tell the tale. Mr. Reseigh is a native of Cornwall, England, and has only been in Canada a few months. By his coolness and pluck many lives were saved, and the destruction of thousands of dollars worth of property avoided.

A Lesson in Cheap Mining.—Any facts serving to show how, with proper care and intelligence, the expenses of mining and reducing free milling gold ore may be carried on, cannot be republished too often. Therefore we give the following facts, taken from the *Financial and Mining Record*, of the Spanish mine in Nevada county, California. The figures given relate to operations in the month of November, and, we may add, are sworn to by the mine superintendent, F. W. Bradley, as required by law in this instance. The record is as follows:

MINE.

Thirty days work produced 4,057 tons of ore.

	Labor.	Supplies.	Total.
Extracting ore.....	\$679 63	\$196 65	\$876 28
Delivering ore to mill..	193 25	13 69	206 94
Dead work.....	100 90	14 35	115 25
General expense.....	70 70	4 75	75 45

Total.....	\$1,044 48	\$229 44	\$1,273 91
Cost per ton.....	25 8-10 c.	5 6-10 c.	31 4-10 c.

MILL.

Twenty-nine days' work reduced 4,047 tons of ore.

	Labor.	Supplies.	Total.
Mill expense.....	\$225 67	\$162 82	\$388 49
Water for power.....	5 00	198 00	203 00
Handling ore.....	177 00	2 40	179 40
General expense.....	70 71	4 75	75 46

Total.....	\$478 38	\$367 97	\$846 35
Cost per ton.....	11 8-10 c.	9c.	20 8-10 c.
Bullion produced.....			\$2,644 57
Total expense.....			2,120 27

Profit..... \$524 30

This shows the ore to have worked only a trifle over sixty-five cents per ton. Cost of mining and milling combined was about fifty-two cents per ton. In working this large amount of ore a net profit of only thirteen cents per ton was made, the total profit being \$524.30 on 4,047 tons of ore. As we have remarked before,

the mine is worked under exceptionally favorable circumstances, and the ore is easily reduced; but it is surprising to know that under any conditions a profit, however small, can be made out of such very low grade rock. Water power is used to drive the Huntingdon mills, but has to be paid for.

Petroleum Fields of the United States and Canada.—Mr. B. Redwood describes the method and cost of boring for petroleum in the various petroleum districts. In the Washington field, Pennsylvania, the wells are much deeper than in the older fields, and are invariably torpedoed, often more than once, the charge in some cases being 80 quarts of nitro-glycerine. Nearly all the wells are flowing wells, and should yield a 100 barrels a day in order to pay, owing to the expense of boring, which averages 7 to 8 shillings a foot as against 2 shillings in the Bradford district. Besides Pennsylvania, New York and Ohio, the States of West Virginia, Kentucky, and Tennessee also produce oil in large quantities, and it is also found in many other States. In California there are also one or two small fields. In one, tunnels were driven into the hill-side, but the yield was small; as a general rule, the wells have to be pumped. The Canadian petroleum industry dates from 1857; the principal field now is Petrolia, sixteen miles south-west of the outlet of Lake Huron and Bothwell, thirty-five miles distant. There are now 2,500 productive wells, with an aggregate production of 70,000 barrels per annum. The wells at Oil Springs, Petrolia, are about 375 feet deep, and are torpedoed with 8 to 10 quarts of nitro-glycerine.

Salt Mining in Canada.—Nearly all the salt produced in the Dominion is manufactured in Ontario, adjacent to Lake Huron, the largest number of working wells being situated in the County of Huron, whilst a few are being operated outside of this area in the counties of Lambton on the south, Bruce on the north, and Perth on the west. There were nineteen wells working during 1886, six of which are located at Godrich, where the salt was originally discovered. The remainder of the works are located at the following places:—Dublin, Seaforth, Clinton, Hensall, Exeter, Blyth, Kincardine, Brussels, Cartwright, Glaston and Wingham. Numerous other wells have been bored and blocks operated besides these, but are not now working, owing to the depression in this industry. The first discovery was made at Godrich, in 1865, in a boring made there in search for petroleum. In 1876 Mr. Attrill put down a drain and drill-hole near Godrich, which came upon the first salt bed at a depth of 997 feet from the surface, and in a depth of 520 feet below this the hole penetrated six salt beds aggregating 126 feet in thickness, the thinnest bed measuring six feet and the thickest thirty-five feet wide. The salt occurs at a greater depth in passing eastwards from the lake shore, a boring at Seaforth, about thirty miles south-east from Godrich, having struck salt at a depth of 1,035 feet.

The Largest Smeltery on the Continent.

—The immense smelting works at Omaha, Nebraska, are the largest of their kind in America and as the erection of works of a similar nature are at present, under contemplation in various parts of our Dominion, a brief sketch of these may prove of interest and value to our readers at the present time:—The Omaha works were a small establishment originally started by Messrs. A. L. King, C. H. Downs, C. W. Mead

and General W. W. Lowe in 1869, which has gradually advanced with the city until at the present time, the works have far outstripped in growth and magnitude, all other establishments of the kind in America, and in conjunction with the Grant Smelting works of Denver, (which are owned by the Omaha firm,) the company can lay claim to the largest smelting establishment in the world. Whilst the Denver establishment, however, is confined to smelting operations only, the Omaha shops both smelt and refine. The large quantities of ore which daily find their way into Omaha for treatment are principally brought from Montana, Idaho, Colorado, Utah, Dakota, and Arizona. Base bullion is also shipped to the works on a large scale from the different smelting works throughout the country, for the purpose of refinement. About 40 per cent of this latter substance comes from the Denver branch of the firm. An idea of the magnitude of the company's operations may be gathered from the fact that they employ over 500 men and have already \$3,000,000 invested in the enterprise. The annual business done by the corporation, too, is in the like proportion. During the last year upwards of 315,000,000 has been "turned over." The company receives on an average 200 carloads of ore per month, and over 200 cars arrive monthly laden with base bullion consigned to them. When the ore or bullion arrives at the works the first thing done is to make an assay, from which the company is enabled to measure the amount of lead, silver, gold, antimony, or any other metals they will severally yield per ton, and so accurate has this process become that by treatment of a comparatively small portion the furnaces will disclose, almost to a dollar, the net value of a large shipment. Cash is then paid according to the prices for the time being ruling in New York. The ore is now treated on the larger scale. As in the assay this is effected through the medium of reverberatory furnaces so constructed that by means of a dome, or low arched roof, the flame in passing through the fire chamber, is reflected or reverberated in the ore. Whilst undergoing this fiery ordeal the metals are separated and the attendant at the furnace secures them in the form of base bullion or unrefined metal. Lead, silver, gold and antimony are thus extracted from the same ore. The bullion is then moulded into bricks, which are in due course sent to the refinery. Here they are again placed in reverberatory furnaces and all existing dross and foreign substances are extracted until nothing remains but the pure metal. This also is moulded into bricks. The gold brick made by the company weighs 250 ounces and is worth \$5,000. Silver is turned out in \$1,000 ounce bricks which are worth about \$1,000 each. This process of reducing the ore is, of necessity, of the most technical nature, and a thorough knowledge of metallurgy and chemistry is necessary for a proper appreciation of its intricacies. To enter into an elaborate dissertation on the inner workings of the process, however, would be outside the scope of this article. The greater portion of the gold and silver is forwarded to the United States mints, at New Orleans and Philadelphia, where it is purchased by the government. The refined silver sells at prices ranging from 94 cents to \$1.15 per ounce, whilst gold brings the uniform price of \$20.67 per ounce. For the half year ending July 1, of the present year, the works have turned on 4,583, 264 ounces of silver and 40,640 of gold, whilst they have placed the enormous amount of 28,514,000 pounds of lead on the market during the same period. For the last named

metal the ruling price is about 4½ cents per pound. The company is also extensively engaged in the manufacture of blue-stone, of which they turn out sixty barrels per day. This substance is principally employed in the working of electric batteries. The works cover a great area of ground and comprise a series of solidly constructed brick buildings in which the seething flames of upwards of one hundred furnaces are constantly at work.

The Decline of Natural Gas in America.

—In a paper read at Cleveland, Mr. N. B. Wood expressed the opinion that the supply of natural gas is rapidly being exhausted. Either gas is being formed, or the quantity being wasted has been over estimated, or the supply must soon be exhausted. The two latter are, perhaps, the facts in the case, but the last is the more important. Immense gas wells will cease to be known in a few years, and those districts which are now the most productive will be soonest exhausted. Already there are reports of the failure of noted wells; and noted districts are becoming unproductive. Careful and conservative engineers are advocating laws regulating the sinking of wells and the more economical use of gas. At Erie, where gas has been used for a great many years, the supply has fallen off to such an extent that it is now being piped into the city from a distance. Credible information states that since so many gas wells have been sunk at Findlay the quantity of gas has perceptibly diminished. The only exception is East Liverpool, where gas has been used in the potteries for twenty years without sign of exhaustion.

Crude Phosphate as a Fertilizer.

—Our readers who have been following the discussion in these pages on the question of the utility of crude phosphate as a fertilizer, will read with interest the remarks of Mr. Andrew H. Ward, Boston, on the subject. Mr. Ward in an able article recently contributed to the *Eastern Farmer*, says:—

"Of all the crops raised, corn requires the largest amount of phosphoric acid, 100 bushels with stover abstracting from the soil sixty-four pounds, while potatoes and tobacco take from the soil a large amount of potash, 600 bushels of potatoes abstracting 219 pounds. It is assumed that the soil contains enough of the other mineral elements for the growth of crops, for we are constantly informed that all that is required to add to the soil is nitrogen, phosphoric acid and potash, and latterly nitrogen is not held in as high esteem as it was, particularly in the growing of corn. The experiments in Connecticut on this crop show the nitrogen increased the crop enough to pay the cost thirteen trials out of ninety-six.

"The pecuniary loss rose and fell with the amount of nitrogen used. With mineral fertilizers alone the crop gathered some sixty-five pounds of nitrogen per acre. As sixty-four pounds of phosphoric acid can be furnished in fine ground phosphate of lime at \$1.28, and 219 pounds of actual potash in murate of potash for \$7.66, both combined costing \$3.94 to furnish the mineral elements deemed necessary to supply to the soil the amount abstracted from it by 100 bushels of corn or 600 bushels of potatoes. It does not seem to be economy, good judgment, or profitable, to let our lands run down and go to waste, and it will not be long before agriculture will be more thought of in this section, and more attention given to it.

"The one great want has been manure. Our stock has decreased, our lands have not been kept in condition for the want of manure and a bad system of tillage, consequently farming has not, as a general thing, been so profitable as to induce those who could get out to remain in, or induce those who were out to come in, but our farms have now got to a price that should induce purchasers, and by the application of artificial manures they can be made to grow paying crops at once.

"With fine-ground raw phosphates as the basis of operations, we can now obtain complete manures for any culture, made according to any formula and containing in a readily assimilated form all the ingredients called for."

Wire Rope Haulage and its Application to Mining.

By Frank C. Roberts, C.E., Philadelphia, Pa.

Continued from January Issue.

II. INCLINED PLANES.

It is often found economical and convenient, when sinking a shaft, to incline the line of descent at an angle to the vertical, so that the material shall be hoisted on trucks running on track systems. Power is supplied by hoisting engines, and for this reason these planes are denominated engine planes. Again, in many localities, especially in the bituminous coal region, the adits to the mine are at a considerable elevation above the overground system of transportation, requiring the lowering of the mining-product from the mine to convenient points for shipment. This is usually secured by means of an inclined plane termed a gravity plane, and operated by the gravity of the descending load. In either type of inclined plane the line of descent may be curved or have variable grades, the only requisite being that the fall shall be in one direction and that the grade shall be sufficient to enable the loaded or empty car to descend by gravity.

Fig. 8 represents the arrangements of tracks

most economical in construction for either system, while it also has the merit of a capacity equal to that of any other. The section C is termed the *parting*, its purpose being to enable the descending and ascending cars to pass each other. For this reason it is placed in the centre of the inclined plane. The distinguishing feature of this road-bed is that above the parting we have three lines of rails, while below we have but two. This plan necessitates the use of an automatic switch at the lower point (A) of the parting (see Fig. 11, which is, however, reversed in position, as compared with Fig. 8). This simple arrangement consists in two iron-bound timbers pivoted at one end and moving over the rails. In the illustration the switch is arranged so that the loaded car going up will take the track S while the wheels of the descending car on M, in passing A, will shift the switch to the position shown in dotted lines. When the next loaded car ascends it passes into the parting on the track M. This arrangement of road-bed has been in use with great success, and the general verdict of the mining community is that it answers, to all intents and purposes, the ends sought by more expensive devices. To avoid the necessity of the automatic switch at the lower end of the parting, the system illustrated in Fig. 9 has been devised. Its operation will be readily

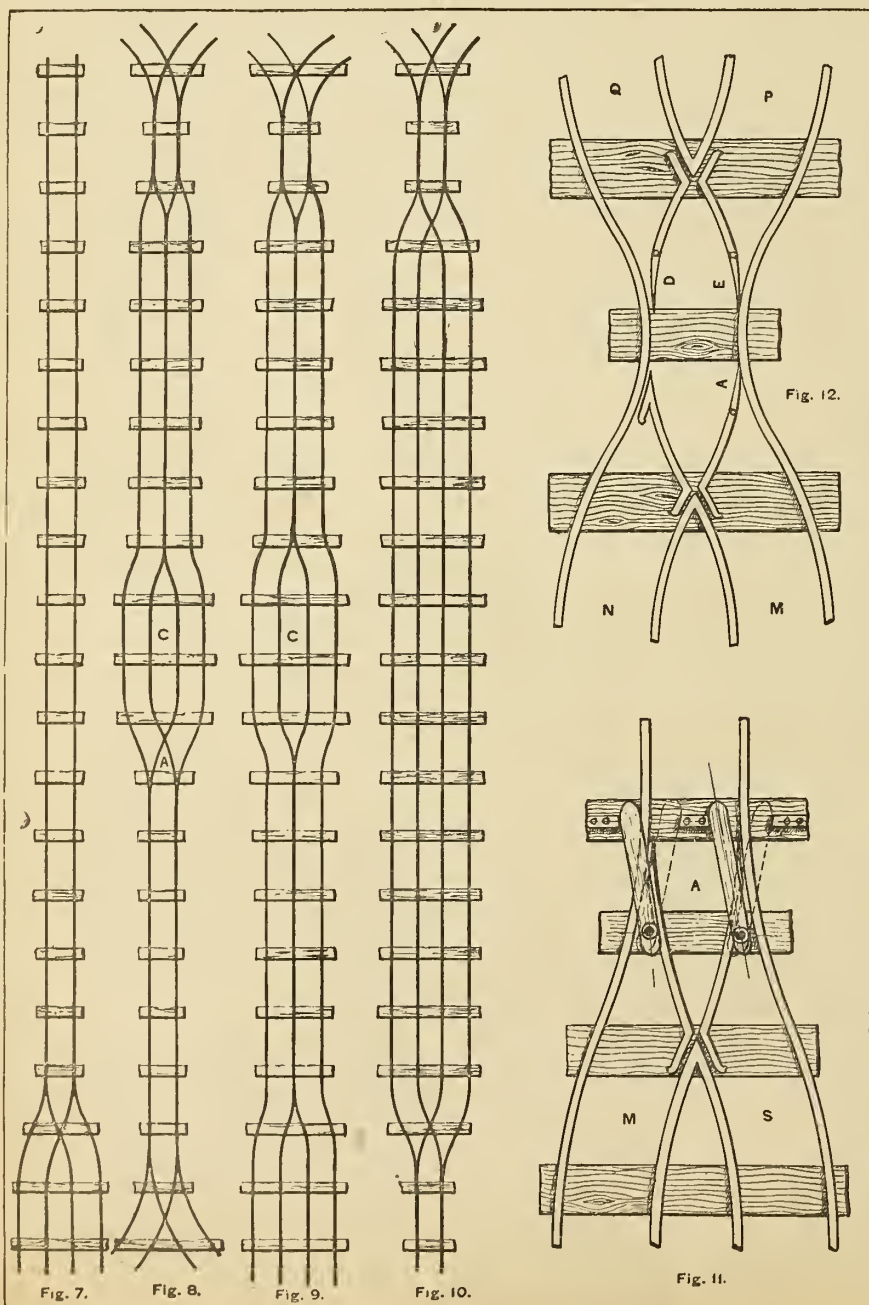
understood from the figure. The double-track incline, Fig. 10, is frequently employed, but the extra expense of broader road-bed renders it less common among mines of ordinary capacity. Where the output is very large, however, its advantages are evident.

An important detail in connection with all inclined planes is the arrangement of switches placed at the mine-end of the plane. Fig. 12 shows a simple and efficient device. The switch consists of three pivoted tongues, which govern, according to their position, the disposition of the cars. In the gravity system the loaded cars descend alternately by the tracks P and Q, and the empty cars always pass to N. In the engine-incline the loaded cars *ascend* alternately by the same tracks, the *loaded* cars here passing to N. As the switches are placed, the empty cars, in the gravity-plane, will pass to N and the loaded cars advancing by M will pass to Q, while the empty car returning by P will open E and close D. A being closed, the empty car passes again to N, while the next loaded car advancing by M, descends the plane by P. Except that the tongue A has to be kept closed by a tender, the switch is automatic. The same is true of the operation of the switch at the head of an engine-plane, except that the loaded instead of the empty cars pass to N.

In all inclined planes it is necessary to employ some form of safety-device to provide against accidents arising from the breakage of the hoisting-rope. Much attention has been directed to these safety-devices, but in all designs the operation is dependent upon one of two principles—either to stop the cars or to guide them off the incline. The chief objection to these devices is that they are all controlled by a man stationed at the head of the plane. It is to be regretted that there exists no simple and inexpensive method whereby the safety arrangements are rendered automatic, as in the vertical hoists.

Fig. 13 represents a simple device for stopping runaway cars. Two heavy iron-bound timbers, A, are pivoted near their centres at the side of the outer rails, as shown. The arrangement of counter-weights is such that when it becomes necessary to bring the timbers into action the pin P, forming the connection between the two timbers, is withdrawn by pulling the wire S, connecting with the head of the plane. As a result, the release of the counter-weights W throws the timbers over the rails, as indicated by the dotted lines. A number of these devices are placed along the incline, all being connected to the single wire leading to the head of the plane. This method is somewhat inferior to the one illustrated in Fig. 14, owing to the uncertainty of stopping the cars when descending at a great velocity, their tendency being to jump the timbers and continue their course. The device shown in Fig. 14 consists in side-switching the car. This is performed by the tongues D, E, F and G, actuated by a system of bell-cranks and weights, as shown. The switch is held open by the pin P, and when this is withdrawn by means of the wire S, the switches are closed by the action of the counterweights W. This device, although resulting in the partial destruction of the car, renders the danger to life and valuable property considerably less than the preceding arrangement. What is known as the *dead-fall* is employed in some mines. A heavy timber, guided in an upright frame, is placed over the track, and, when released, falls over the rails.

In all applications of wire rope except vertical hoists, it is necessary to support the rope at



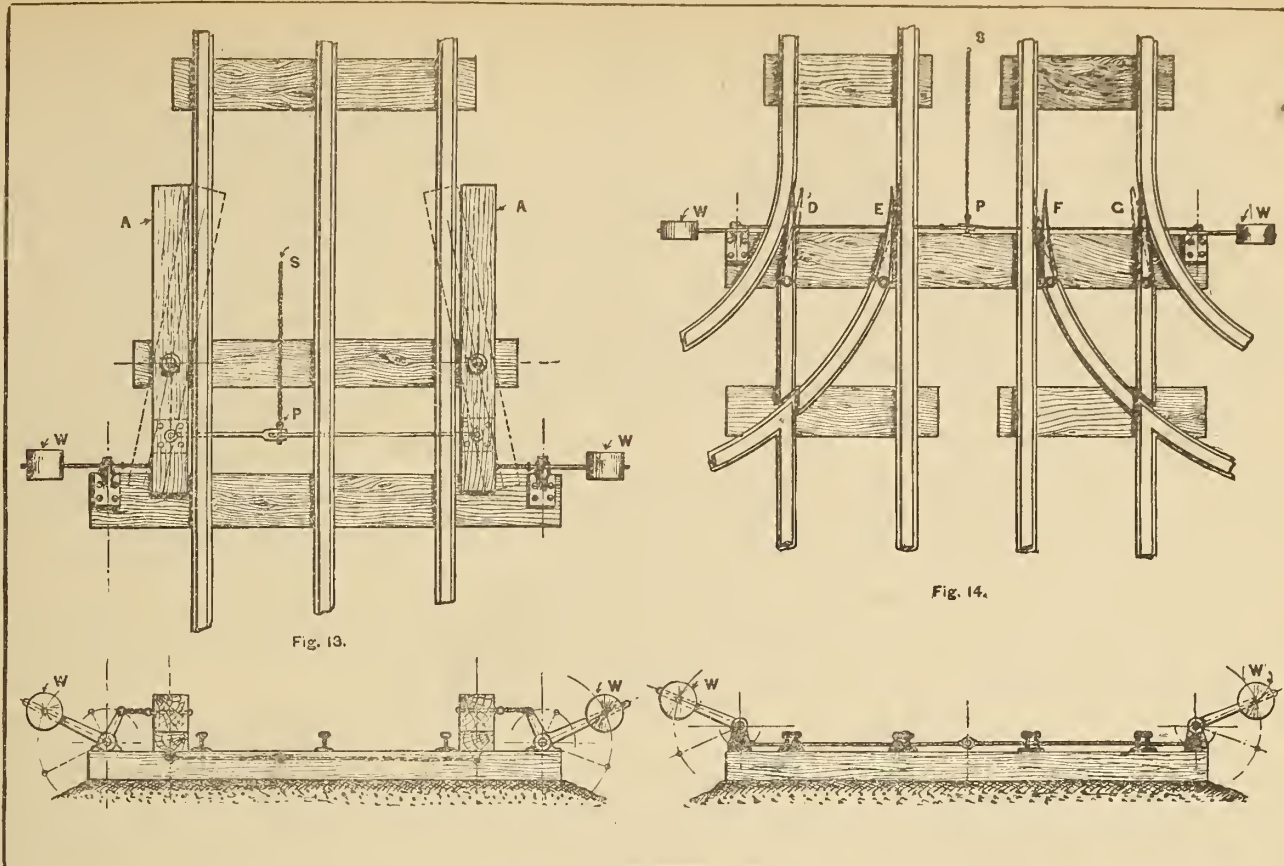


Fig. 13.

Fig. 14.

frequent intervals by rollers, otherwise the rope would drag upon the ground and increase the power absorbed by friction, as well as cause the rope to wear out rapidly. A cheap and efficient roller (Figs. 15 and 16) is constructed of gum-wood, of as large a diameter as is consistent with the location, and from 12 to 24 inches in length. The axles are 1 inch or $1\frac{1}{4}$ inch round iron, running in simple cast-iron bearings. The much-discussed question of comparative detrimental effect upon wire rope of wooden and iron rollers is doubtless to be answered in favour of the former; but whatever the advantage may be, it is so slight that it is hardly worth consideration, since, in a properly-constructed plane, the rope simply rests upon the rollers.

Curves.—The difficulty of passing curves is solved by two efficient and simple methods. Figs. 17 and 18 illustrate one device, whereby the rope is taken round a curve by means of a series of wheels about 24 inches in diameter, placed outside the track. The car, in turning a curve, brings the rope between the rails; but, after passing, the rope is guided back into the

groove of the wheels by the timbers C, placed in front of each pulley. The guide-wheels are sometimes placed, as shown at A, Figs. 19 and 20, between the rails and a few inches to one side of the centre line. These wheels are, of necessity, smaller than the preceding, and are held in a slightly-inclined position to the horizontal by the bearings E, Fig. 20. The rope is

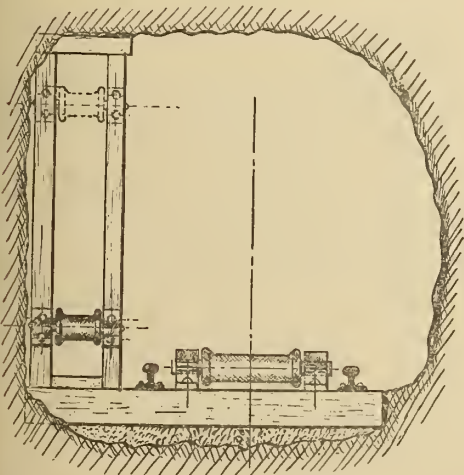


FIG. 15.

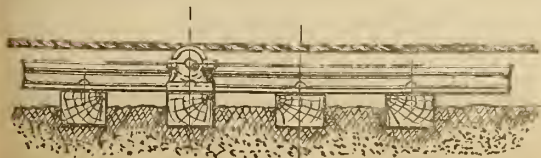


FIG. 16.

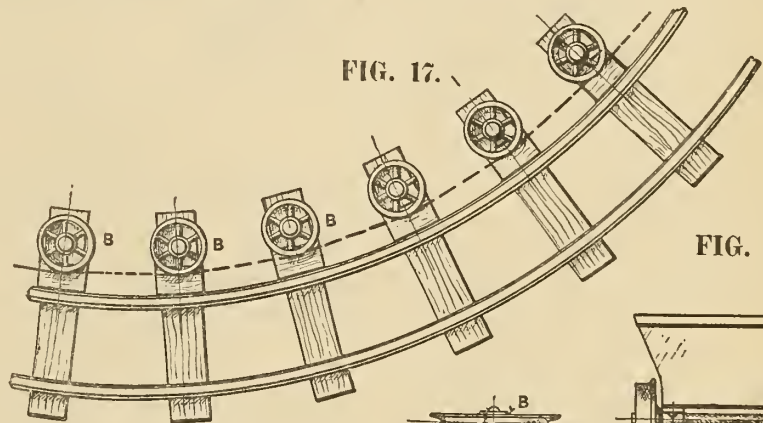


FIG. 17.

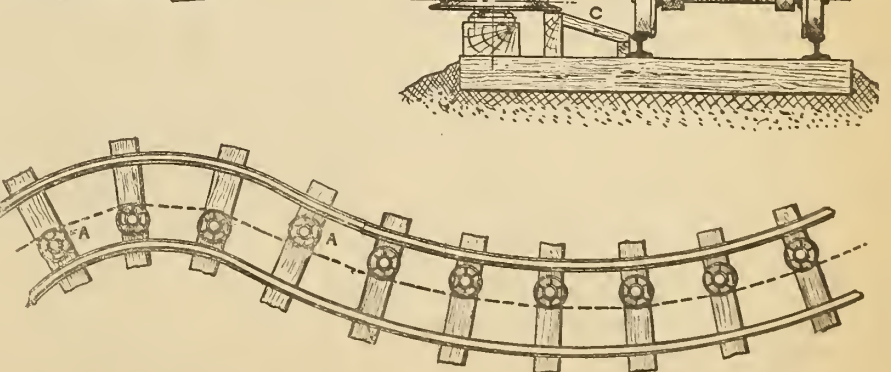


FIG. 18.

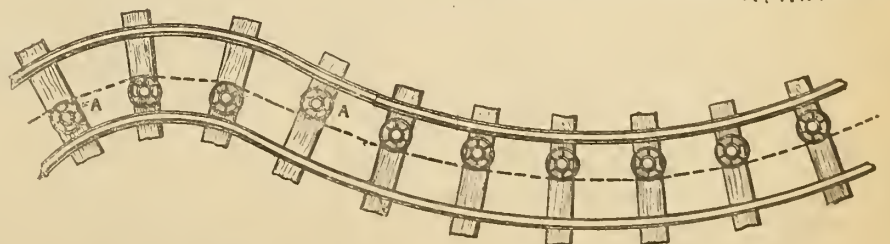


FIG. 19.

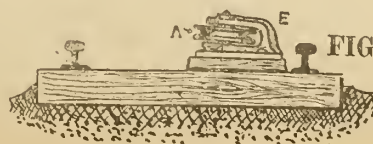


FIG. 20.

attached to the car at the same level as the grooves of the wheels. In passing a curve the rope is drawn to the centre of the track, and falls back into the grooves when the curve has been rounded. Either of these systems may be employed with advantage, the determination of the more efficient being a matter of location.

(To be continued.)

American Institute of Mining Engineers.

The fiftieth meeting of this Institute, being the eighteenth annual meeting, will be held at Boston, Mass., beginning on Tuesday evening, 21st instant. We are indebted to Dr. Raymond, Secretary of the Institute, for the following information regarding the proceedings:—

Tuesday Evening February 21.—Opening session at 8 p.m. at Hotel Brunswick, to be called to order by General Francis A. Walker, President of the Massachusetts Institute of Technology. After the addresses of welcome and reply, there will be, at 10 p.m., a supper, at which visiting members and friends will be the guests of the local committee.

Wednesday, February 22.—Sessions morning and afternoon, at the Institute of Technology. In the evening, a subscription dinner at Hotel Brunswick.

Thursday, February 23.—Omnibuses will leave Hotel Brunswick at 8.20 a.m. for Fitchburg depot. Special train leaves depot at 8.55 a.m., arriving at 10.25 a.m. at Fitchburg, where Simonds' rolling machinery for rolling car axles, conical and spherical shot and various irregular shapes, Simonds' saw factory, and (for those who desire it) the works of the Putnam Machine Company, and the Fitchburg Steam Engine Company, will be visited. The party will be entertained at luncheon by Mr. Simonds', and the train will leave Fitchburg about 1.15 p.m., arriving about 2.50 p.m. at Waltham, where the Waltham Watch Works will be visited. Leaving Waltham about 4.30 p.m. the party will reach Boston about 4.45 p.m. Those who wish to inspect the famous testing-machine at Watertown can easily arrange to include this excursion by omitting the stop at Waltham, in which case they will arrive in Boston at 5.08 or 5.38 p.m.

On Thursday evening there will be a session at the Institute of Technology.

Friday, February 24.—Morning and afternoon will be devoted to minor excursions and visits, of which about twenty have been planned, a guide being provided for each. Opportunity will be given to members to signify their choice among these. The more important of those thus far arranged are to the following places:

The Sewage-Pumping Engine (visit under the auspices of the Boston Society of Civil Engineers); the Harvard University Museums and Laboratories; Cotton Mills at Lowell; the Clapp-Griffiths Works; the Laboratories of the Massachusetts Institute of Technology; the Norway Iron Works; the Tyler Tube Mill; the Ames Shovel Works at North Easton; the Mitis Works at Neponset; the Boston Art Museum.

On Friday evening the closing session will be held at the Institute of Technology. At this session the Annual Report of the Council will be presented, and the result of the election of officers will be announced.

Members desiring to present papers at this meeting will notify Dr. Raymond as soon as possible, forwarding either the full manuscript of papers or abstracts, with such information as to nature, length, amount of illustrative drawings, etc., as will permit a judgment as to their

acceptability. The following papers have been announced up to the present time:

The Formation of Fissure Veins, by S. F. Emmons, Washington, D. C.

Spirally Welded Tubing, by J. C. Bayles, New York City.

The Theory of Jigging, by H. S. Munroe, New York City.

Notes on the Topography and Geology of the Cerro de Pasco, Peru, by A. D. Hodges, Jr., Boston, Mass.

The La Plata del Libano Mines, Columbia, by Willard Ide Pierce, New York City.

Western Kentucky Coals and Cokes, by Joseph H. Allen, Mannington, Ky.

Steel Rails, by Frederick A. Delano, Chicago, Ill.

The Thermal Properties of Slags, by H. M. Howe, Boston, Mass.

The Russell Process in Its Practical Application and Economical Results, by Ellsworth Dagget, Salt Lake City, Utah.

Recent Developments in the Open Hearth Process, by Alfred E. Hunt, Pittsburgh, Pa.

The Husafel Furnace for Making Malleable Iron, by F. Lynwood Garrison, Philadelphia, Pa.

An Improved System of Water Supply for Hydraulic Mining, by H. D. Pearsall, London, Eng.

The Determination of Silica in Cinder, by R. H. Lee, Lewiston, Pa.

A Method for the Estimation of Manganese in Steel, by Frank Julian, Chicago, Ill.

A Glossary of Furnace Terms, in English, French and German, by Thomas Egleston, New York City.

Systems of Mining in Large Bodies of Soft Ore, by R. P. Rothwell, New York City.

Prominent Sources of Iron Ore Supply, by John Birkinbine, Philadelphia, Pa.



In General.

Messrs. Couper, McCarnie & Co., London, Eng., in their Buyer's Circular of the 16th ult., state: "MINERAL PHOSPHATES.—Canadian.—The shipments for 1887 show that 20,000 tons were exported to United Kingdom and Continent during the past season, which maintains the average of recent years. South Carolina Phosphates are held firmer, but the price is not yet sufficiently remunerative to encourage Raisers to sell any large quantities for this market. Somme Phosphate.—The only obstacle to a general acceptance of the Syndicate terms has been a few resales of speculative parcels; in spite of this, a fair business has passed at the rise. Belgian Phosphates dull, and little doing. Sail freights are getting scarce, and will tend to increase the quotations slightly for this material. There is not much doing in Cambridge Coprolites, and to effect business Raisers have been obliged to accept a low price.

Since our last issue, we have received communications from prominent shippers asking us to give an unqualified denial to the statement that Canadian ore on reaching Great Britain is frequently handled by interested parties, who grade the ore below its true quality, and thus force the miners to take any price buyers on the other side may offer.

Du Lievre.

Mr. C. C. Hoyer Millar, of Messrs. Millar & Co., Montreal, a partner in the well known firm of phosphate brokers, Messrs. Couper, McCarnie & Co., London, England, and a director of the Canadian Phosphate Company, Ltd. (the company which has been formed to take over the phosphate lands of the Union Phosphate Mining and Land Company, at West Portland), accompanied by Mr. O. M. Harris, his representative in Montreal, visited the company's mines during the last week in January for the purpose of seeing what new machinery, tramways, buildings, etc., would be required for the future working of the new company's mine and augmentation of the output. Mr. Millar was much pleased with the present appearance of the workings, and entertains great hopes for the future of this large undertaking. We learn that a tramway from the mines to the river will be laid early in the spring, and that considerable extra machinery is being purchased, and also that more cobbing houses, tenements, etc., are to be built almost immediately. The number of employees will also be increased.

The rumour which gained currency in several of the Ottawa papers that Mr. Wm. Mackintosh had been appointed superintendent of the Canadian Phosphate Company's Mines has no foundation in fact. Captain J. E. Smith, who conducted operations with so much acceptance to the Union Company, will retain the position with the new corporation.

We are informed that the Commercial Union Phosphate Company has been incorporated in the State of Wisconsin with a capital of one hundred thousand dollars, to operate phosphate lands in the township of Portland West. Mr. J. A. McIntosh, of Milwaukee, is one of the promoters, and among other gentlemen mentioned are Mr. James L. Gates, lumberman; Mr. James Kneeland, gentleman; Messrs. Ames and Avery, Real Estate Agents; Mr. Henry Herman, Real Estate, all of Milwaukee; and Mr. R. G. Peters of Manistee, Mich., the principal owner of the well known Beaver silver mine near Port Arthur. Operations will be commenced early in the spring. The capital stock is divided into one hundred shares of a par value of \$100.00 each.

A correspondent to *The Daily Review*, Milwaukee, writes:—

"I am informed that some of Milwaukee's leading financial gentlemen are interested in this company. When such men as James Kneeland, R. G. Peters, Manistee, James L. Gates, Messrs. Ames and Avery, and other gentlemen of very high financial and commercial standing are interested in this company, there can be but one opinion on the success of the Commercial Union Phosphate Company, and that is, financial prosperity to all those interested and a boon of great value to the agricultural community, who require so much of this great fertilizer to restore the worn out fields to their original producing capacity. Phosphate, in its natural state, ground, is one of the finest fertilizers in the world for house plants and garden vegetables, being odorless and adds a fine flavor to all kinds of plants. It is stated by the very highest scientific authority that every ton of wheat absorbs 16 pounds of phosphate from the soil. In this case how much does the great agricultural districts and wheat growing countries require of this—the greatest gift of nature's provider to replace what is every year absorbed from the soil. It is unquestionable that nothing has yet ever been discovered to equal apatite or phosphate for fertilizing purposes."

The Du Lievre Milling and Manufacturing Company, who, up to the present time, have only been running their grinding mill at Seabury (Bassin du Lievre) are making arrange-

ments to push the development of their mining property, and as soon as spring opens a large gang of miners will commence work at the Lillie mine. This will ensure a supply of rock for grinding. When last prospected, a rich vein was opened up showing a large quantity of high grade ore and the management are confident that by pushing mining operations vigorously, profitable results will accrue. We are informed that everything is now ready for extensive operations: boarding house, cook house, smith's shop, steam plant and machinery, all being in position ready to start work. With ample capital this Company propose to mine, grind, and market their own product, for which contracts for large supplies have already been made. A portion of the ore will be treated by Mr. Shirley's new process, by which the crude rock is rendered soluble.

The contractors are making rapid progress with the construction of the Lock and Dam at Little Rapids.

A night shift has been put on at the North Star. The blacksmith shop at this mine was burned down last month.

The Central Lake mine is turning out well, and gives promise of a large output when navigation opens.

The Emerald and North Star are turning out about their usual winter's output, and large shipments will be made during the coming season.

Latest advices from the Lievre announce that the staff at the Little Rapids mines will be considerably augmented in a few weeks. During the winter many valuable bodies of ore have been uncovered, and arrangements are being made to prosecute the work on a more extensive scale than heretofore. The shipment last year, with a comparatively small number of men, figured over 700 tons, averaging from 81 to 85%: there is every indication that this high standard will be maintained during the coming season.

Templeton District.

Mr. Trimble, of Montreal, managing director of the Templeton and Blanche River Company, was out at the mines during the month completing arrangements for the immediate erection of steam working plant and machinery. Everything is being done conducive to a large output as soon as the shipping season opens.

Mr. R. Blackburn states that some 60 men are working at his celebrated mines, and that the quantity and quality of the ore is steadily improving. Three hundred tons have been hauled to the river, and the sheds at the mines are full. The present output is very largely sugar phosphate.

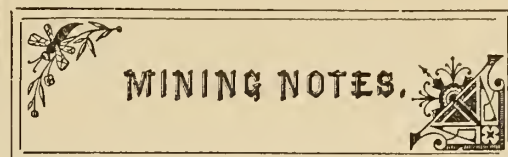
Kingston District.

Captain Boyd Smith, of Washington, D.C., proprietor of the Blessington Mines, sailed per s.s. Aurania for London on 11th instant. He will be on the Continent some time, and hopes to secure a large number of miners and their families to settle on his properties in Canada.

With a largely increased force, skilled labour, and improved machinery, Superintendent Harris will produce a large output from these mines during the ensuing season.

Phosphate land in Sydenham is attracting

more attention than ever, and five hundred acres which Captain Boyd Smith, of Washington, bought for \$7,000 a few years ago, is held now at a quarter of a million.



Nova Scotia.

All the Nova Scotia collieries are greatly hampered through scarcity of rolling stock on the Intercolonial railway, caused in part by the snow blockades, on the northern division, and increase of business.

Owing to these causes, the shipments from the Springhill mines for last month only amounted to 26,228 tons of 2,240 lbs. The output under ordinary circumstances would have been over 29,500 gross tons.

A trial test of nine tons of quartz taken from a 5 inch lead on the Cochrane Hill property yielded 18 ozs. of gold.

The 15-stamp mill is kept running night and day, and about 45 men are employed at the Cowan mine, Kemptville

The International Coal Company held its annual meeting at Montreal on 15th instant. The following directors were elected:—Sir D. A. Smith, M.P., Messrs. Hugh McLennan, John McLennan, A. Kingman and T. B. Brown. At a subsequent meeting of the directors Mr. H. McLennan was elected president and Mr. T. B. Brown secretary-treasurer.

Quebec.

At the Villeneuve Mica and Mining Company's mines, one of the buildings used as a store, sleeping house, and other purposes, has been burned to the ground since our last. The fire originated through an overheated stove-pipe: the loss is covered by insurance.

The annual meeting of the company was held in Ottawa on Wednesday, the 14th inst., when the following were appointed officers for the ensuing year:—President, S. P. Franchot; Secretary-Treasurer, G. Von Rehn; Directors, B. H. Buxton, E. Hodges and F. Gorman. It was decided that all meetings of the company will henceforward be held at Buckingham.

The company entertain hopes of an extended business during the coming year. The output continues to fulfil every expectation both as to quantity and quality. A crystal was taken out last month which weighed a little over 160 lbs.

Mr. Thomas Cosgrove, Hathaway, was in the city lately with several very likely specimens of phosphate, asbestos and other minerals taken from his property.

We are informed that the Boston Asbestos Company have sold all their output for the coming year at a rate not less than \$75.00 per ton.

The Scottish Canadian Asbestos Company are erecting a crusher and other plant which will do away with the slow and expensive mode of hand cobbing hitherto employed. It is estimated that the new machinery will cost over \$10,000.

Ontario.

The new opening made recently on the Richardson mine, near the old pocket, looks well, but as yet no depth has been obtained, sufficiently to prove a true vein.

Capt. Symonds, Superintendent of the Bristol Iron Co's mines, gave us a call during this month. He states that the calcining furnaces recently erected by Messrs. Taylor and Langdon are not giving the satisfaction promised, and roasting has temporarily suspended. Captain Symonds leaves for New Jersey, in a day or two, on a visit to the patentees of the furnaces and hopes to be able to have the defect remedied and work resumed at an early date.

There are at present 80 men on his pay roll. 20,000 tons of ore are on the dump, of which 6,000 has already been calcined. Mining will be conducted with vigor as soon as the snow leaves the ground.

A general meeting of the Lake Superior Copper Company (Limited) was held in London, England, on the 5th instant. For the purpose of enabling the company to resume mining operations, the directors are authorized to issue the remainder of the unallotted ordinary shares of the company, or such portion of them as they might deem necessary, at a discount of 75 per cent., and upon such terms as they may think fit. The chairman explained, however, that within two days a legal difficulty had arisen which rendered the directors unable to submit the resolution, it having been stated on high legal authority that directors had no power to issue shares at a discount. The activity in the copper market and the rise in the price of copper seemed to afford the company the opportunity for which it had long waited, of beginning their work again on a considerable scale. At the time the work was stopped, the prospects were all in favor of the mine turning out an exceedingly good one. The stuff had improved in quality from the surface to the point they reached. To work it the shareholders would have to make some sacrifice—they would have to take shares with some slight liability in order to be able to get the outside public to come in. The expense of unwatering the mine would be £400 or £500, but they must have two or three months' capital in hand—to work the mine they ought to have £10,000. Resolutions were passed requesting the directors to take immediate steps for relieving the shareholders from any liability at present attaching, or supposed to be attached, to the shares at present issued, and for obtaining capital for the future working of the mine in such a manner—either by the sale of the property or otherwise—as may be deemed best.

Some strong veins of white mica are being opened up at Mr. D. G. MacMartin's mines at Pike Lake. As development proceeds the crystals are found to increase in size and to be more regularly formed. Several hundred pounds of merchantable mica have already been taken out and await transportation. The output and quality improves daily, and the product of this mine will be sufficient to furnish a large portion of the demand for Canadian consumption.

The vein being developed at the Tough and Stobie gold property continues to improve as depth is attained.

Mr. W. B. McAllister is boring for oil at Pembroke. A depth of 100 feet has been attained, and favorable indications are reported.

Port Arthur District.

The BADGER MINE is rapidly coming to the front as a favorite. Those who inspected the mine last week report much of the ore extracted as equal to the best output of the celebrated Beaver mine. It is the intention of the owners to have fifty men at work as soon as the accommodation is complete and the mine sufficiently advanced for their profitable employment, which will probably be about May next.

The BEAVER MINE is working steadily along, producing silver in quantity. A number of silver bricks were brought into town for shipment last week. Everything around this mine indicates that men of wealth, who believe thoroughly in their prize, are working it to the best of their ability.

SILVER MOUNTAIN has apparently settled down into a comfortable existence. Although nothing astonishing in the way of valuable silver deposits are reported, it is evident from the extreme caution of the managers in keeping their operations to themselves, that they intend somebody to benefit thereby. It is stated that parties, not a hundred miles from Port Arthur, cabled for a number of shares to Liverpool, but were answered that all were sold and none in the market.

The CROWN POINT Mine, immediately adjacent to Silver Mountain, develops slowly with a very small force. More accommodation, however, for man and beast is being provided by the owners, who are buying up adjacent land suitable for building purposes.

The CARIBOU MINE under Capt. Rothwell is developing richly and gives great satisfaction to the owners, who are also preparing for work on a larger scale.

MINING LOCATION R. 230 is beginning to fall into hands worthy of such a promising prospect. Ore quite as rich as the best Silver Mountain or Beaver Mine specimens have been taken out of this mine. The Marquis of Huntley, who visited this district last summer, is reported to have control of nearly, if not quite all of this prospect, and will erect a stamp mill next season should the output continue satisfactory.

THE PORCUPINE Mine is again doing a little, and it is reported will shortly become the property of a syndicate able to do it justice.

The Ontario Government are preparing early for the increased traffic into the mining region by building an almost entirely new bridge across the Kaministiquia River on the Government road to the mines.

What is wanted very badly, however, is a railroad, and it is to be hoped that the Ontario

FOR SALE.

Asbestos Mines.

On Lots 27, 28 and 29, in Range A, of Colrairie, Megantic County, P. Q.

300 ACRES,

One Mile from Quebec Central Railway.

Free from Reserves or Royalties.

James Reed,

Reeddale, Megantic, P. Q.

Government will realize that they have the right and that it is their bounden duty to assist such an enterprise. Two schemes are now being pressed on the notice of the Government—the first being a road direct from Port Arthur to connect with the Duluth and Iron Range Extension, of which about ten miles have already been built from Port Arthur westward. The other is practically the same as the former for the first fifty miles or more, and then runs direct for Winnipeg to take its share of the immense grain trade which is now suffering from lack of sufficient accommodation. Both schemes have excellent backing, and only want the usual Provincial legislation and bonus to start them vigorously into life.

The topographical survey of the great lakes in this interesting region is progressing favorably under Messrs Russell and Macdougall, who will remain in the field as long as the ice holds good.

A great deal of harm is being done to the Thunder Bay district by the extravagant reports given in the Winnipeg papers and reported as emanating from ex-manager Kirkland of the Beaver mine. He is reported to have said that he had sold one-half of his interest in that mine for \$600,000 and could not manage to get it back again for \$700,000. This is rubbish pure and simple, as we have it on excellent authority that Mr. Kirkland neither has or had any interest whatever.

The district is all right and does not need any "booming."

Manitoba and North-West Territories.

The severe weather has greatly retarded work at the mines of the Canadian Anthracite Coal Company, at Banff, and about two hundred men have been idle for several weeks. Latest reports, however, state that the weather has modified, and that operations have been resumed.

The Edmonton *Bulletin* states:—Five coal mines are being operated to keep this town and immediately vicinity supplied with fuel, all within what might be called the corporation limits—W. Humberstone's, D. Ross', and Frank Hall's on the north side, and J. Walter's and E. Caverhill's on the south side.

British Columbia.

At a meeting held lately at Nanaimo, it was decided to organize a Mining Institute for the district.

The explosion which occurred about nine o'clock on the morning of 24th ultimo, in No. 5 shaft of the Wellington Colliery, owned and operated by R. Dunsmuir & Sons, has proved to be a more serious disaster than was at first anticipated. About two hundred men, whites and Chinese, were in the mine at the time, and latest reports show that at least ninety of these perished. As the shaft timbers were destroyed and cages could not be used, a pulley and rope were immediately prepared. A temporary cage was made and lowered to a considerable depth. Several of the imprisoned miners reached it and were hauled up. In the last level, where it is believed the explosion occurred, 25 bodies were found in a heap, some of them terribly disfigured. Messrs. Dunsmuir's loss is estimated at between \$25,000 and \$30,000.

The *Colonist* has received a private despatch from Nanaimo announcing that the East Wellington Colliery, operated by W. S. Chandler, has been shut down. No reason is assigned.

Advices from the Treadwell mines near Juneau, Alaska, state that on New Year's day, the powder magazine containing 2,000 pounds of blasting powder exploded with terrific force, blowing the building into atoms and doing much damage to surrounding property. Fortunately the miners were all working on the ledge beyond the reach of the explosion, and only one life was lost. A workman in the mill, oiling shafts some distance above ground, was thrown down and severely injured. The explosion was felt with great force in Juneau, two and a half miles away.

The Alaska *Free Press* reports that negotiations are in progress with English capitalists for the purchase of the Bears Nest claims on Douglas Island. One million and quarter dollars are wanted.

A number of miners are now preparing to start into the Yukon, crossing the lakes and making the journey down the river on the ice. They expect to reach the mouth of Forty-Mile creek about the middle of April, and get up that stream to their claims by the time the ice breaks up, which is from the 1st to the 15th of May. By being on the ground at that time they can get in about four months work before their return next fall.

"SHE."

Improbabilities Sometimes Become Realities—A True Woman's Fidelity.

Several works bearing unique titles, written in fascinating style, and giving evidence of wonderful imaginative power have lately been received by the reading public with much popularity and pleasure.

Perhaps the most striking of them is the book bearing the odd title of "She." In this the author has fairly outdone himself in his popular line. Ayesha and her beloved Kallikrates are unique characters in fiction. Ayesha, the heroine, is a beautiful creature who tasted of the essence of nature's forces at the fountain head, and became immortal.

Her patient waiting for the coming of Kallikrates, the beloved of her youth, whose individuality was maintained through centuries, though the change called death regularly occurred, only to be followed by rebirth, is a fine illustration of woman's fidelity.

The closing scene, when she conducts Kallikrates to the very centre of the earth, the birthplace of all life, in order that he may taste of immortality, is a fit climax to the fine creation.

The question naturally suggested by this strikingly original story is whether there is not somewhere in nature, a potent force whereby life may at least be temporarily prolonged.

Mrs. Annie Jenness Miller, editor of "Dress," says: "In every instance Warner's Safe Cure has the effect to give new energy and vitality to all my powers." Mme. Gray, teacher of Oratory and Physical Culture at Syracuse, declares: "Before I tried physical culture and Warner's safe cure, I was a confirmed invalid. I owe much to that excellent remedy, and do not hesitate to acknowledge it."

Human life seems too short, though men in

former ages lived longer than those of the present. History tells us that they lived more in accordance with nature's laws—their mode of living was extremely simple, and in their daily life they followed the dictates of human intelligence.

If sickness comes, we of to-day, seek the remedy among the artificial forces instead of resorting to the field of nature.

If, when diseases come, we would consult nature, the chances are that we would fare better, for we would then treat the cause of such disorders. Modern research has shown that most of the commonly known diseases owe

their origin to the unhealthy state of the kidneys, the blood purifiers of the system, and if they are kept in a healthy state by the use of Warner's safe cure, a vegetable compound and simple production of nature, much of the prevailing sickness would be happily averted.

It is probable that the author of "She" derived many of his beautiful imaginings from close communings with nature, for we are all agreed that whatever is of or from nature is more beautiful and wholesome, than that which is artificially constructed.

* Dingler's Polytechnisches Journal.

CHEMICAL LABORATORY

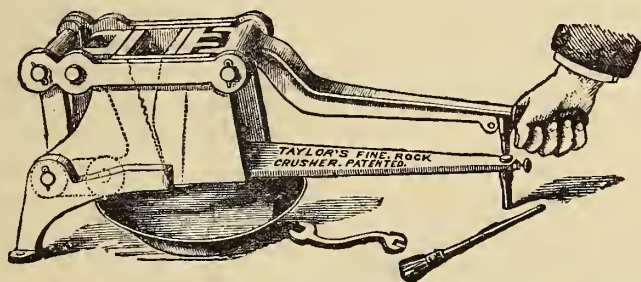
OF THE UNIVERSITY COLLEGE OF OTTAWA,

Under the direction of PROF. C. F. MARSAN, M.A., Dominion Examiner of Public Analysts, and A. L. TOURCHOT, Demonstrator of Applied Chemistry.

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Rock Drills, Air Compressors,

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E. GAUJOT,

MINING ENGINEER.

BELLEVILLE, ONT.



Notice to Contractors.

SEALED TENDERS addressed to the undersigned and endorsed

Tender for Post Office, &c., Prescott, Ont.,

will be received at this Office until Thursday, 8th March, 1888, for the several works required in the erection of Post Office at Prescott, Ont.

Specifications and drawings can be seen at the Department of Public Works, Ottawa, and at the office of E. Jessup, Esq., Collector of Customs, Prescott, on and after Tuesday, 14th February, and tenders will not be considered unless made on form supplied and signed with their actual signatures.

An accepted bank cheque payable to the order of the Minister of Public Works, equal to five per cent. of amount of tender, must accompany each tender. This cheque will be forfeited if the party decline the contract or fail to complete the work contracted for, and will be returned in case of non-acceptance of tender.

The Department does not bind itself to accept the lowest or any tender.

By order,

A. GOBFIL,
Secretary.

Department of Public Works, }
Ottawa, 8th February, 1888. }

2-2



Notice to Contractors.

SEALED TENDERS addressed to the undersigned and endorsed

Tender for Iron Stair-cases at New Departmental Building, Wellington Street, Ottawa, Ont.,

will be received at this Office until Thursday, the 15th March, for the several works required in providing and erecting Iron Stair-cases at New Departmental Building, Wellington Street, Ottawa.

Specifications and drawings can be seen at the Department of Public Works, Ottawa, on and after Thursday, 16th February, and tenders will not be considered unless made on the form supplied and signed with the actual signatures of tenderers.

An accepted bank cheque, payable to the order of the Minister of Public Works, equal to five per cent. of amount of tender, must accompany each tender. The cheque will be forfeited if the party decline the contract, or fail to complete the work contracted for, and will be returned in case of non-acceptance of tender.

The Department does not bind itself to accept the lowest or any tender.

By order,

A. GOBEIL,
Secretary.

Department of Public Works, }
Ottawa, 8th February, 1888. }

2-1



SEALED TENDERS addressed to the undersigned and endorsed

Tender for Cobourg Work,

will be received at this office until Tuesday, the 13th March, for rebuilding a portion of the Western Pier at Cobourg, Ont., in accordance with a plan and specification to be seen at the Department of Public Works, Ottawa, and at the office of the Town Trust, Cobourg.

Tenders will not be considered unless made on the form supplied and signed with the actual signatures of tenderers.

An accepted bank cheque payable to the order of the Minister of Public Works, equal to five per cent. of amount of tender, must accompany each tender. This cheque will be forfeited if the party decline the contract or fail to complete the work contracted for, and will be returned in case of non-acceptance of tender.

The Department does not bind itself to accept the lowest or any tender.

By order,

A. GOBEIL,
Secretary.

Department of Public Works, }
Ottawa, 16th February, 1888. }

VALUABLE PLUMBAGO AND OTHER Mineral Lands FOR SALE,

IN THE TOWNSHIP OF BUCK-
INGHAM, COUNTY OF
OTTAWA.

1st.—Lot 28, in the 6th range, containing 100 acres, in addition to the salina of the lake.

2nd.—North half of lot 23, in the 5th range, containing 100 acres.

3rd.—Nine acres of lot No. 28, in the 5th range, with water privileges thereto appertaining, being site of mill dam, etc., etc.

The property formerly belonged to the Montreal Plumbago Mining Company, and was worked successfully for several years, until the company's mill was destroyed by fire, but the mill dam remains almost uninjured, and there are on the property several houses, sheds, etc., built for various purposes when mining operations were carried out.

The Plumbago Deposits

upon the property are regarded as amongst the richest and most extensive in the Dominion. As to the quality of the Plumbago, it has been extensively used in the manufacture of crucibles, lubricating leads, stove polish, etc., etc., and given unbounded satisfaction. This is established by the experience of consumers, and by a certificate from the celebrated Battersea Crucible Works, London, England, a copy of which is open for inspection.

MICA

has also been discovered in quantities.

The lands are in the Phosphate region, and recent prospecting has disclosed a rich and extensive deposit of this mineral. There are unrivalled facilities for transporting the ore to and from the mines by the Ottawa River and C. P. Railway. Distance from mines to Railway Station 6 miles. Good road.

All that is required to make these valuable mines handsomely remunerative is a little capital and enterprise.

The Title is Indisputable.

For information apply to

WM. H. DICKSON,
160 Waller St., Ottawa.

H. E. DICKSON,
Russell House, Ottawa.

OR TO THE OFFICE OF

THE CANADIAN MINING REVIEW,
OTTAWA.

FOR SALE. VALUABLE Copper Mining Properties — IN THE — Eastern Townships

TOWNSHIP OF ASCOT.

- 1st. Clark Mine, Lot 11, R. 7 Ascot 187 acres
- 2nd. Sherbrooke Mine, part Lots 12 and 13,
R. 7 Township of Ascot..... 329 "
- 3rd. Belvidere Mine, part Lots 9 and 10, R.
9 and 10, R. 8 Ascot 292 "
- 4th. Mining Rights in same vicinity on..... 250 "

All of the above properties lie within $1\frac{1}{2}$ miles of the Village of Lennoxville, at the junction of the Grand Trunk, Canadian Pacific and Passumpsic Railways, and have been developed to a considerable extent, and veins opened 6 to 20 feet in width, yielding 3 to 5 per cent. of copper, also silver, and 35 to 40 per cent. of sulphur. These mines are only $2\frac{1}{2}$ to 3 miles distant from the City of Sherbrooke, and evidently are of the same class of ores found at Copelton, only four miles distant, owned and worked by the Orford Copper and Sulphur Company, and by Messrs. G. H. Nichols & Co., of New York, which have proved so remunerative.

TOWNSHIP OF ORFORD.

- 5th. Carbuncle Hill Mine, Lots 2 and 3 R. 14, and
2, 3, 4 R. 15, 718 acres. Same class of ore as is found
in the Ascot properties above described, but yielding a
higher percentage of copper.

TOWNSHIP OF CLEVELAND.

- 6th. St. Francis Mine, $\frac{1}{4}$ Lot 25 R. 12, 50 acres, with
dwelling houses, smith's shop, ore sheds and office, large
winding and pumping steam engine, with boiler, winding
and pumping gear, and about forty fathoms Cornish lift-
ing pumps complete, railway tracks, ladders, etc., situated
three miles from Grand Trunk Railway. A consider-
able amount of mining work has been done at this mine.
A well defined vein richly charged with vitreous purple
and yellow sulphurets of copper traverse the entire
length of the property, five feet in thickness, yielding 8
to 40 per cent. metallic copper.

TOWNSHIP OF GARTHBY.

- 7th. Fifty-six lots of land, 2,938 acres. This prop-
erty for the most part is unexplored, but copper is found
on the greater part of the property. On one of the lots
a vein about twenty feet in width has been found.
Samples of the ore have yielded as much as 22 per cent.
of copper, being also rich in sulphur. Other samples of
pyrites from the same property, free from copper, have
yielded as high as 48 per cent. of sulphur. The only
drawback to this property is in its distance from the
railway, it being about four miles from Garthby Station,
Quebec Central Railway. A new line is chartered,
however, which, when built, will run directly through
the property.

TOWNSHIP OF ACTON.

- 8th. The Acton Mine, 100 acres, with engine, boiler,
pumps and appliances. Within three years after this
mine was first opened it produced nearly \$500,000
worth of copper. It is situated about half a mile distant
from the stations of the Grand Trunk and South Eastern
Railways.

- 9th. Brome Mine, part Lots 2 and 3 R. 4, 50 acres.
- 10th. Bolton Mine, two miles from Eastman Station,
Waterloo & Magog Railway, 400 acres.

The above properties formerly belonged to the Canadian Copper and Sulphur Company, and were acquired by the present owner at sheriff's sale, giving an indisputable title thereto.

The whole or any portion of the property will be sold at reasonable prices.

For further information apply to

WM. FARWELL,
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RUSSELL & CO., PROVINCIAL AND DOMINION LAND SURVEYORS, CIVIL AND MINING ENGINEERS, PORT ARTHUR, ONTARIO.

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Post for 1 cent for 4 oz. or up to 24 oz. in weight.
Information regarding mines cheerfully given. Correspondence
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Associate Royal School of Mines, &c.,
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Mineral Regulations

TO GOVERN THE DISPOSAL OF

Mineral Lands other than Coal Lands, 1886.

THESE REGULATIONS shall be applicable to all Dominion Lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, iron or other mineral deposits of economic value, with the exception of coal.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein, either by surface or subterranean prospecting for mineral deposits, with a view to obtaining under the Regulations a mining location for the same, but no mining location or mining claim shall be granted until the discovery of the vein, lode or deposit of mineral or metal within the limits of the location or claim.

QUARTZ MINING.

A location for mining, except for iron on veins, lodes or ledges of quartz or other rock in place shall not exceed forty acres in area. Its length shall not be more than three times its breadth and its surface boundary shall be four straight lines, the opposite sides of which shall be parallel, except where prior locations would prevent, in which case it may be of such a shape as may be approved of by the Superintendent of Mining.

Any person having discovered a mineral deposit may obtain a mining location therefor, in the manner set forth in the Regulations which provides for the character of the survey and the marks necessary to designate the location on the ground.

When the location has been marked conformably to the requirements of the Regulations, the claimant shall within sixty days thereafter, file with the local agent in the Dominion Land Office for the district in which the location is situated, a declaration or oath setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as aforesaid; and shall, along with such declaration, pay to the said agent an entry fee of FIVE DOLLARS. The agent's receipt for such fee will be the claimant's authority to enter into possession of the location applied for.

At any time before the expiration of FIVE years from the date of his obtaining the agent's receipt it shall be open to the claimant to purchase the location on filing with the local agent proof that he has expended not less than FIVE HUNDRED DOLLARS in actual mining operations on the same; but the claimant is required, before the expiration of each of the five years, to prove that he has performed not less than ONE HUNDRED DOLLARS' worth of labor during the year in the actual development of his claim, and at the same time obtain a renewal of his location receipt, for which he is required to pay a fee of FIVE DOLLARS.

The price to be paid for a mining location shall be at the rate of FIVE DOLLARS PER ACRE, cash, and the sum of FIFTY DOLLARS extra for the survey of the same.

No more than one mining location shall be granted to any individual claimant upon the same lode or vein.

IRON.

The Minister of the Interior may grant a location for the mining of iron, not exceeding 160 acres in area which shall be bounded by north and south and east and west lines astronomically, and its breadth shall equal its length. Provided that should any person making an application purporting to be for the purpose of

mining iron thus obtain, whether in good faith or fraudulently, possession of a valuable mineral deposit other than iron, his right in such deposit shall be restricted to the area prescribed by the Regulations for other minerals, and the rest of the location shall revert to the Crown for such disposition as the Minister may direct.

The regulations also provide for the manner in which land may be acquired for milling purposes, reduction works or other works incidental to mining operations.

Locations taken up prior to this date may, until the 1st of August, 1886, be re-marked and re-entered in conformity with the Regulations without payment of new fees in cases where no existing interests would thereby be prejudicially affected.

PLACER MINING.

The Regulations laid down in respect to quartz mining shall be applicable to placer mining as far as they relate to entries, entry fees, assignments, marking of localities, agents' receipts, and generally where they can be applied.

The nature and size of placer mining claims are provided for in the Regulations, including bar, dry, bench, creek or hill diggings, and the RIGHTS AND DUTIES OF MINERS are fully set forth.

The Regulations apply also to

BED-ROCK FLUMES, DRAINAGE OF MINES AND DITCHES.

The GENERAL PROVISIONS of the Regulations include the interpretation of expressions used therein; how disputes shall be heard and adjudicated upon; under what circumstances miners shall be entitled to absent themselves from their locations or diggings, etc., etc.

THE SCHEDULE OF MINING REGULATIONS

Contains the forms to be observed in the drawing up of all documents such as:— "Application and affidavit of discoverer of quartz mine." "Receipt for fee paid by applicant for mining location." "Receipt for fee on extension of time for purchase of a mining location." "Patent of a mining location." "Certificate of the assignment of a mining location." "Application for grant for placer mining and affidavit of applicant." "Grant for placer mining." "Certificate of the assignment of a placer mining claim." "Grant to a bed rock flume company." "Grant for drainage." "Grant of right to divert water and construct ditches."

Since the publication, in 1884, of the Mining Regulations to govern the disposal of Dominion Mineral Lands the same have been carefully and thoroughly revised with a view to ensure ample protection to the public interests, and at the same time to encourage the prospector and miner in order that the mineral resources may be made valuable by development.

COPIES OF THE REGULATIONS MAY BE OBTAINED UPON APPLICATION TO THE DEPARTMENT OF THE INTERIOR.

A. M. BURGESS,

Deputy Minister of the Interior.

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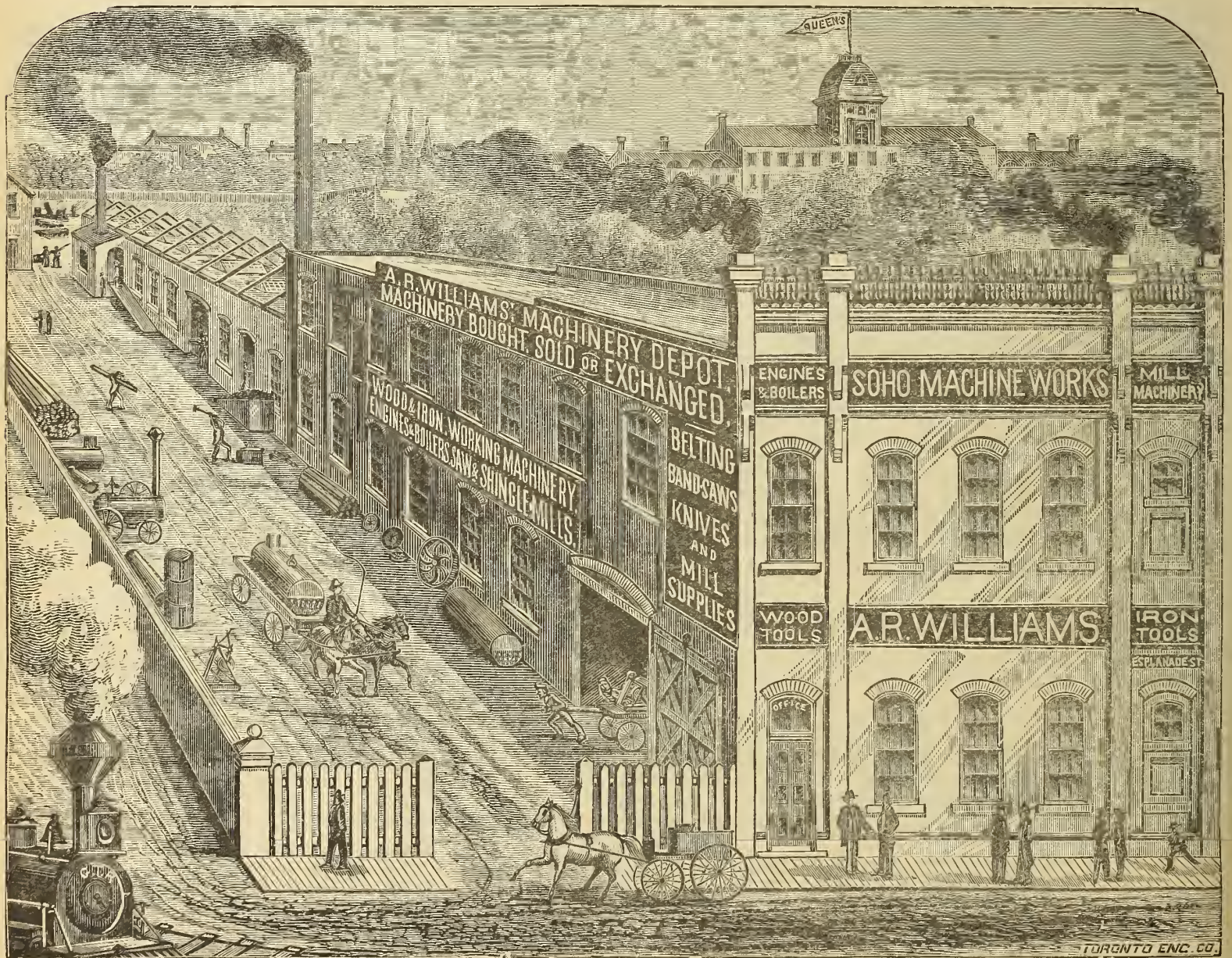
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THE Canadian Mining Review

Established 1882.



Vol. VI.—No. 3.

1888.—OTTAWA, MARCH—1888.

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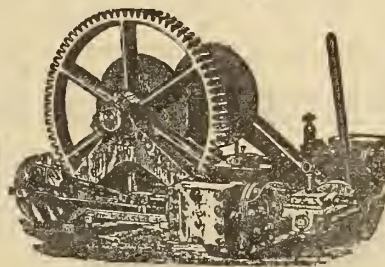
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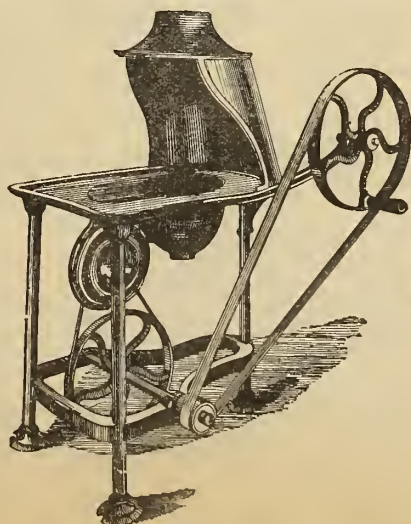
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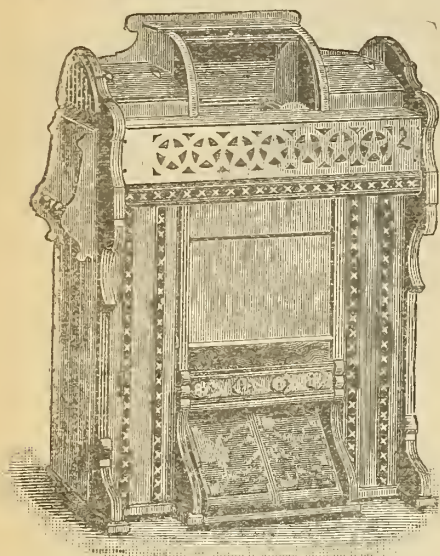
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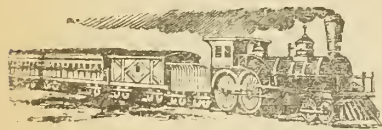
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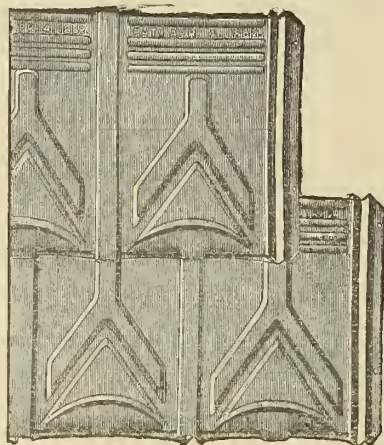
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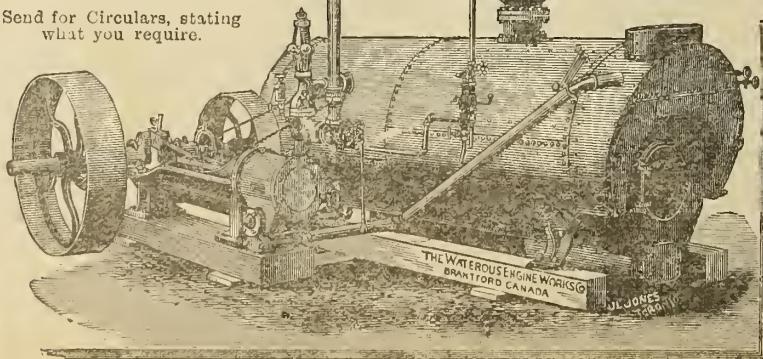
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Recently a disposition has been manifested to check this criminal waste of a rapidly diminishing source of revenue, but so far with little practical effect. In the sale of mining lands, for instance, the Government reserve the timber for three years. During that time the lumberman who owns the limit in which the lands are situated has the privilege of removing such timber as he may want. Very frequently this timber would be of considerable value to the miner in the construction of his works and buildings, but having no direct interest in the timber, and having every interest in learning the character of the rocks beneath it, his first step after taking possession is usually to start a forest fire to burn the moss, forest growth and debris from the rocks. But with them goes valuable timber. It is lost to the owner of the land, to the limit holder, and to the Province. Unfortunately, the fire is seldom limited to the locality of its origin, but extends into neighboring properties, sweeping large areas of timber. Thus by the insane policy of the Government does the work of destruction go on, and while they are encouraging tree-planting in the old settled parts of the Province, they are every year, by their stupidity, destroying more of the primitive forest growth than the entire population of the Province could replace in a generation. No wonder summer droughts are increasing; no wonder the agriculturists in the

older portions of the Province find farming a less remunerative occupation than in bygone days; their representatives at Quebec are removing from the Laurentian hills the forests which protected the sources of the rivers and preserved the moisture necessary for the steady development of their farm products. Some day the eyes of the people will be opened to the mischief which has been wrought, and to the necessity of adopting a measure of forest protection before all is lost. What is wanted is an amendment to the Mineral Act which will give the proprietor of the land the ownership of the timber upon it from the day of purchase, thus making it his interest to exert himself to save such portions of the forest as do not interfere directly with his operations.

How Commercial Union Would Effect Our Industry.

At a meeting of the Toronto Commercial Union Club held in that city at the end of February last, a valuable paper on the mining interests of Canada, and how they would be effected by Commercial Union was read by Mr. T. D. Ledyard. In this paper he alluded to the great richness of Canadian iron ore; he pointed out how the state of the iron trade is the financial barometer of a country's prosperity, and how, if that trade is prosperous, other lines of business take their cue from it. Whilst our grain markets are threatened with curtailment by Indian and Australian wheat, our ores are looking up. England derives from and for a long time has been dependent on Spain for most of her Bessemer ore, and from that quarter comes also the greater part of the iron ore imported into the United States. But the iron producing districts of Spain are threatened with an early exhaustion, the production being already much reduced. Mr. Ledyard claimed that "a very few years must see the end of them," and no part of the world "will offer greater inducements for the manufacture of steel than our own Canada. In that case it would not be at all surprising to see some of the large English iron manufacturers transporting their works to Canada." At present the duty of 75 cents per ton prevents many of our iron deposits from being worked. An American expert after viewing the Belmont mine, the ore of which is of exceptional purity, stated that if he was working it, he would take out 400 tons a day. The duty on this would be \$300, and how would such a per diem tax work on any industry? The removal of this duty alone by Commercial Union would benefit both Canadians and Americans alike. Apart, however, from the export trade, there are large quantities of lower grade ore which it would not pay to export, but which could be profitably smelted on the spot if we had a market large enough to induce capitalists to put up the necessary works. The Canadian market is too small for this, but if the whole North American market was open to us there are many points where furnaces would

be erected, and the manufacture of iron and steel would benefit the whole community. Although the C. P. R. traverses hundreds of miles close to deposits of Bessemer ore suitable for making steel, the very rails used on that railway were bought in England, probably made of Spanish ore, and did not contribute one dollar's worth of benefit to any Canadian, although similar ore from which they are made is almost alongside the track. Four-fifths of their value might have been distributed to pay for the labour of our own mines and mechanics had furnaces existed here. Instead of this, said Mr. Ledyard, our money has gone to pay Spanish mines and English labourers who care nothing for us and who could not probably point out Canada on the map.

Nature never intended Customs barriers to keep apart two portions of the same continent which she intended to be commercially one. These remarks apply not only to iron but to pyrites, the demand for which for sulphuric acid manufacture is now assuming very large proportions in the United States, but on which the duty of 75 cents per ton prohibits any trade, the pyrites being only worth \$4.50 per ton in New York. Copper ore would be shipped largely to the States if there was no duty, the tariff barring the way, and consequently the new copper districts in Algoma and Nipissing remain undeveloped. The same remarks apply to several other minerals. The opponents of Commercial Union tell us we have the Canadian markets, but 300,000 tons of pig iron is about the annual consumption of Canada, whilst the North Chicago Rolling Mills alone use 1,700 tons a day, or as much as would supply the whole of Canada! Mr. Ledyard wound up his remarks by saying "let us have free trade with 'our own continent, our natural market.'"

Mining Report, 1887, for British Columbia.

The Annual Report of the Minister of Mines for 1887, being "An account of Mining operations for Gold, Coal, &c.," in the Province of British Columbia, has been laid on our table, and the digest of it, after careful perusal, will prove of great interest to our mining friends generally.

The total estimated yield of gold last year in the Pacific Province is valued at \$693,709, being a decrease since 1886 of \$209,942. Several reasons are given in the reports from the various districts for this falling off, the principal of which appears to have been the unusually dry season which compelled most of the hydraulic claims to shut down very early in the year, the limited number of men employed on productive works, and the giving out of the old placer mines. An impetus to gold mining during the coming season is anticipated, owing to the reports which have been received from all quarters of the discovery of ledges carrying the precious metal in different degrees of richness, and the increasing confidence bestowed on

quartz veins in various locations. Quartz mining is proverbially slow in its first stage, and particularly so when the ore is of low grade, as such can only be handled profitably by wealthy companies. The large amount of prospecting carried on last summer has brought to notice many creeks containing gold in paying quantities, but veins are not so easily found owing to the heavy growth of timber generally covering them. One of the chief centres of quartz mining is Illecillewaet. One year ago this place was comparatively unknown, but a village last summer grew up around the C. P. R. station. The metal obtained here is silver, and the shipments by the Selkirk Company between 25th July and 7th November consisted of some 250 tons of selected ores, representing a gross value of \$21,000, and a net value at the smelter of \$15,000, nearly \$63 per ton as the average net yield at the latter. The range of the percentage of lead was from 17 to 52, and of the silver assay from 36 to 149 ounces per ton. There exists also at the date of this report ore down at the mines and on the dump valued at \$15,000. A crushing and sampling mill is at work to which is attached a complete assay office. In the Lillooet district the yield of gold has been good, but the work is principally carried on by Chinese from whom it is very difficult to obtain returns. In the Yale district a new and enormously rich mining section is reported, and of Granite City and the surrounding country it is remarked in the Report, "the country is almost untrodden and has vast mineral resources both in quartz and gravel that only await time to discover,—pluck and energy to develop." We note one deficiency in the Report which we hope to be supplied in future issues, viz: tables showing the yield and value of silver in the Province, as this is an interest second only to gold mining and one that is attracting considerable notice.

In the Similkameen Division of the Okanagan District, reference is made to the production of platinum, which last year reached 2,000 ounces, commanding from \$2.60 to \$3.00 per ounce, according to quality. It is stated as a remarkable fact that many thousand ounces of this rare metal have been thrown away by the miners as worthless, in consequence of the prevailing ignorance as to its value. Last year samples were sent to various places, but from insufficient data and few samples 50 cents per ounce was all the value set upon it. One replacer stated it was worth \$2.50 per ounce in Germany if confined in large parcels, but \$3.50 per ounce is at present readily paid for it in Portland, Oregon.

The output of coal in British Columbia appears to be annually increasing, 413,360 tons having been mined last year against 326,633 the year before. As the Pacific coast of the Dominion bids fair to become the coal station of the North Pacific Ocean, when navigation is rapidly assuming very large dimensions, the demand must soon become

limited, and the various cities of the Pacific coast of the United States will also draw their chief supply for domestic consumption from our mines. The principal exports of this fuel are now made to San Francisco, Wilmington and San Diego, in California; to Portland, Oregon; Alaska; the Hawaiian Islands; China and Japan. But the large cities now rapidly growing up, such as Seattle, Tacoma and other places, are now demanding a supply. The Nanaimo and Wellington Collieries are the main sources of supply, but the Kootenay district in the Rocky Mountains gives prospects of very extensive yields if the rich seams which there crop out abundantly are worked.

Among the minerals of this Province which apparently are very little taken into account as yet, are galena and copper. The want of a smelter probably has much to do with this. The present annual consumption of lead in Canada is of the value of \$250,000, and the import duty \$12 per ton. A large demand for lead exists in China, and a profitable trade with that country might be established from the Pacific coast if smelting were carried on in the Province.

It may be inferred from the general tenor of the reports from various mining districts, that placer digging can no longer be relied on for any remunerative returns, as they have been exhausted of their wealth in past years. But in new districts the gravel benches will afford a wide and remunerative field to those who first work them. For lasting returns quartz and ledge mining will be the main objects for the capitalist to venture upon, and the large extent of rich metalliferous country in British Columbia which has not yet been even prospected offer inducements for mining enterprise equal, or at least only second to the rich mining district of the American territories through which the same range of mountains extends, as afford to British Columbia its hidden wealth.

Nova Scotias' Prosperity.

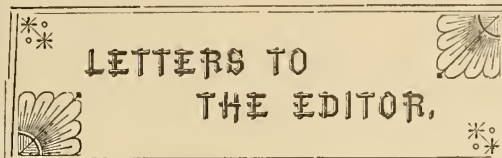
Just as we go to press we are in receipt of the Annual Report issued by the Department of Public Works and Mines for the year 1887. This valuable work is, as usual, replete with interesting matter, but owing to lack of space we are unable to give it any extended notice until our next issue. A very noticeable feature however, is the very gratifying increase of \$21,600.28 in annual revenue over 1886. We commend the following figures to the careful study of the legislators of Ontario and Quebec.

1886.	
Prospecting Licenses.....\$	8896 72
Rents	3794 00
Gold Royalty.....	8550 16
Licenses to Search.....	2980 00
Coal Royalty.....	101,656 53
Licenses to Work.....	500 00
Costs and Fees.....	
Renewal of Coal Leases.....	479 50
	\$126,856 91

1887.

Prospecting Licenses.....	10567 56
Rents	4263 00
Gold Royalty	9420 77
Licenses to Search.....	2560 00
Coal Royalty	119,670 16
Licenses to Work.....	1025 00
Costs and Fees.....	885 70
Renewal of Coal Leases.....	60 00

\$148,457 19



We invite Correspondence upon matters consistent with the character of the REVIEW.

Be as brief as possible. The writers name in all cases required as a proof of good faith.

One dozen copies of the issue containing his communication will be mailed free to any correspondent on request.

We do not hold ourselves in any way responsible for the opinions expressed in this section of the REVIEW.

Mining in the Mountains.

CALGARY, N.W.T., March 2nd, 1888.

The Editor

THE CANADIAN MINING REVIEW:

SIR,—The mining industry of British Columbia is attracting considerable interest out here now, and I have thought that perhaps a short description of the mines on Mount Stephen and around Field, of which I have a thorough knowledge, might prove interesting to your many readers.

These mines are situated 130 miles from Calgary, in the Kootenay District, and I may say, right on the line of the Canadian Pacific Railway. At Mount Stephen there is seen a lode on which there are four locations, viz: "Monarch," "Cornucopia," "Sunrise" and "Carleton" mines. The two first mentioned belong to Coffman Bros. & Co., and the last two to Mr. W. A. Allan, of Ottawa, and myself, each extending 1,500 feet in length by 600 feet in width. The first claim located was called the Monarch from which the lead takes its name, or it might be called the Mother lode. On this mine considerable work has been done. A tunnel has been run in on the vein about thirty feet, showing a vein from the foot wall to the hanging wall of about seven feet of solid ore. The ore is galena lead and silver, averaging by careful assay about twelve ounces silver, and over sixty-five per cent. lead. The foot wall is Black limestone, or, as geologists would say, Cambro Silurian limestone. The hanging wall is quartzite, showing a true vein of ore between two different formations. Lying west of the "Monarch" is the "Cornucopia," showing a body of ore in a vein about two feet wide, of the same character. The vein has been followed in about thirty feet, and it increases in width according as it is developed. Next and adjoining in the east is the "Sunrise" Mine, on which a shaft has been sunk about twenty feet, showing the same vein and the same character of ore. At the top the vein is small, but at the bottom it shows a well developed lead about two feet wide, increasing in width as depth is attained. Adjoining the "Monarch" on the west is the "Carleton" Mine, on which considerable difficulty was encountered in cutting a trail from the Monarch ground. This mine shows a large body of ore about eight feet wide, solid, on which assays have been made showing sixteen ounces of silver and over seventy per cent. lead. From the east end of the "Sunrise" Mine to the west end of the "Carleton" Mine, over one

mile, the vein shows ore in bodies along the whole distance, and I have no hesitation in saying that the Monarch vein or lode for distance is one of the best veins, so far as development, in the Dominion of Canada or on the Pacific coast. Many districts can show richer ore, but none such large bodies at the surface. I speak from experience, as a practical mining man of over twenty-eight years, spent in mining camps on the Pacific coast, and any miner who examines the vein will agree with me. As all those mines are situated about 1,000 feet up from the railroad there will be difficulty in building tramways to bring the ore down, as there is an inexhaustible supply of timber along the Kicking Horse river in front of these mines. All that is necessary, however, is capital and enterprise and the output will be astonishing. East of Mount Stephen lies Cathedral Mountain, on which there are two claims, the Carrie Mine and the Cathedral, both showing large bodies of ore, but containing some iron along with the lead and silver. These mines lie up high on the mountain. A good trail has been built for a mile or so, and the owners will complete it next spring. The formation is the same as Mount Stephen, and the vein lies parallel with the Monarch vein but higher up from the railroad. There is plenty of timber on the mountain side for all practical purposes. The Carrie Mine is owned by Calgary gentlemen.

North and across the Kicking Horse river lies Mount Field, on which are some good locations and mines; first among them being the Alpha, showing a body of ore about six feet wide to which a good trail has been built. The ore is of the same character as on Mount Stephen, except that it carries zinc in place of iron. In other locations the Comstock and Virginia show good indications of mineral and are on the same vein as the Alpha.

These mines comprise that portion of the Kootenay district which I have imperfectly tried to describe, but not to exaggerate. There are also other mines, and many will yet be discovered, as mining is but in its infancy in British Columbia.

I am happy to say people are waking up to the fact that this portion of Canada is rich in all kinds of mineral which, if taken hold of and properly developed by capitalists, will prove a source of great wealth. Now, if these mines were in the United States, they would have long since been taken hold of, but Canadians are only now waking up to the idea that they own in British Columbia mineral deposits as rich and great as the world has ever seen.

JOHN PATTIE.

The Development of our Mineral Resources.

The Editor

THE CANADIAN MINING REVIEW:

SIR,—In my last letter to you on the above subject I dwelt more particularly upon the effect of the land laws, upon the development of our mineral resources, and perhaps a few further suggestions regarding the attainment of this most desirable end may not be amiss so I herewith give them for what they are worth.

Ever since my first acquaintance with the mining districts of the Dominion I have advocated the establishment of nuclei of small local museums at the various mining centres with a view to educating the people of the district to know the appearance of the useful minerals.

I have been much struck by the fact that in districts of very large extent the search for useful mineral deposits is left in the hands of

comparatively few, and when we remember how very close searching is required, and how very unfavourable are the conditions in most of our mining districts the wonder is not how little is found, but how much has been done by those few. Every one who has had anything to do with bush work knows well, that even in the rocky areas where the soil is either absent or only forms a slight patchy covering—the difficulties of seeing anything owing to the thick bush and to the rock being so universally covered up with moss, and with the debris of dead vegetation. When we realise this and how the search for mineral deposits and the determination of their nature and extent when found under such conditions requires so much greater expenditure of time, energy and money than in more open districts where in traversing the country one can see around for a reasonable distance, then we see that what we want is a much greater number of prospectors. More favourable regulations for the acquirement of claims would, as previously pointed out, encourage the influx from other parts of the continent of already trained men, but besides this I think a great deal might be done by taking steps to direct the attention of others, whose business already takes them into our mineral regions, to the search for veins, &c., the finding of which would be not only profitable to themselves but also to the country at large.

These wild sections of the country are continually being traversed by a small army of trappers, voyageurs, pine prospectors, lumbermen, etc., and all these men together with farmers, whose holdings are near rocky mineral areas, could doubtless be led to be continually on the look out for minerals and spend more or less of their time prospecting, which they, being right on the ground, could do at odd times and with little cost.

As a step towards bringing about this wider interest in the subject, I would then suggest that the town councils of such centres as Port Arthur, Sault Ste. Marie, etc., should apply through the proper channels to the Dominion Government for collections of typical rocks and minerals such as are now supplied by the Geological Survey to various colleges and other such public institutions throughout the Dominion. Having obtained this they should house it in a suitable room or rooms where it would be easily and continually accessible during reasonable hours and place it in the charge of some resident, such as I am sure could always be found to volunteer, who would arrange it to the best advantage, keep it in order, etc. Then if the residents of the town would take every opportunity to bring it to the notice of all such as would be likely to put the knowledge thus attained to use, I feel sure that much good would result.

Further, it would be a good thing to start a library of reference in connection with the collections so that not only would an eye knowledge of rocks and minerals be thus obtained, but the means of acquiring a wider and deeper knowledge of these subjects would be placed within the reach of all. A very good way to make a commencement would be to get, at the same time as the mineral collection was obtained, a set of the publications, both (maps and books) of the Geological Survey.

Thus we should have the nucleus of a local museum formed at little or no cost to the community, for the collections, etc., are supplied cost free for such public purposes, and there are doubtless always to be found everywhere some public spirited persons who would be willing

both to provide room, to house and also take charge of them.

Around this nucleus could be gathered collections illustrating other subjects and there might also very usefully be commenced in connection with it collections illustrating the local resources which would be very useful in interesting visiting capitalists and others whilst doubtless the library would be added to from time to time by donations of suitable books from various sources. In fact it would form a centre towards which with efficient management would gravitate many things which would be thus rendered useful to the whole public instead of remaining simply locked up in the possession of private individuals or lost for want of some recognized place to put them.

When I first made this suggestion, in 1884, after visiting the Lake Superior mining region, I also proposed that such collections should be sent to some of the chief Hudson Bay posts where they would come under the notice of the passing voyageurs and trappers which would perhaps lead to very useful discoveries in our great northern wildernesses which, owing to the disadvantages of climate and to the existence of so large a proportion of rocky lands, will probably remain wildernesses unless mineral discoveries cause the opening up of the country.

I am glad to see, from a letter just received from a gentleman to whom I made the same suggestion as above, that at one place steps are being taken to carry out this idea, and if similar results are attained in other places through the wider publicity given the suggestion through the mediumship of your excellent paper, I shall feel that I have not talked nor written in vain.

I remain, Sir,
yours, &c.,
ELFRIC DREW INGALL.

(Mining Geologist of Geological Survey of Canada. Associate Royal School of Mines of England.)

Strong Protest Against Chinese Labor in Pacific Collieries.

A well attended meeting of colliers was held recently in Victoria to consider the proposed amendment to the Coal Mines Act of the Province. Mayor Grant presided.

Mr. Williams, on coming forward, said he was a miner of twenty-five years' experience, and he had come to Victoria to give his views, more particularly on the Chinese question. His experience was that one Chinese were a dangerous element in a mine, and instanced two or three cases where accidents occurred through Chinese being unacquainted with the dangerous nature of gas. A Chinaman in a mine has a roving commission—can come or go where he likes—while a white man, according to the Mining Act, can only go where his working is. His opinion of the recent explosion was different to what was published in the newspapers, but, of course, he was only a poor miner and his opinion did not count for much. His experience, however, with all classes of men in mines, was that a Chinaman was the most stubborn and pig-headed individual in existence in coal mines. The miners had drawn up some amendments to the Coal Mines Act in their own interests which they hoped to have passed in the Legislature, and as the resolutions were framed to save life and property, anyone raising a hand against their law was an accessory to manslaughter should accidents occur in the future. He then referred to the workings of mines, and the danger of employing Chinese therein, and concluded by asking all

present to attach their names to a petition about to be presented to the Legislature.

Mr. Hanna, another of the delegation, and a miner of 24 years experience, spoke in the same strain, referring particularly to the necessity of doing away with the employment of Chinese in the coal mines.

Mr. West spoke briefly in support of the amendments, and hoped the petition would receive many signatures. It was not a question of politics, but a movement in the interest of human life, and could not be looked upon as class legislation. He was very sorry not to see more business men and politicians present, but if the question was properly understood the hall would have been crowded.

Mr. Campbell, a miner, said he was not a speaker of any merit, but he had had thirty years' experience as a miner, sixteen years in British Columbia and the rest in Scotland and the United States. The speaker then gave his opinion of the effect of employing Chinamen in the mines had. He said he had known of Chinamen lighting fires in the mines to warm themselves. This, he said, was very dangerous, for in the event of gas being in the mine, an explosion would occur without a moment's notice. His experience with Chinamen in the mines showed that they are very careless, and the men have come to the conclusion that the Chinamen have been the cause of the explosions in the mines. The miners hoped that the people of Victoria would sign the petition to dispense with Chinese labor entirely. Mr. Dunsmuir had stated that money was no object to him, and that he would do what he could to satisfy the white miners. The speaker said he had put a good deal of faith in Mr. Dunsmuir's remarks, but that gentleman was now trying to do away with the most vital clause in the amendments to the Mining Regulations Act.

Mr. McClymont said that, as was stated by previous speakers, this was not a political meeting, but simply to show the people of Victoria what the miners desire. He considered that any one who would not take this matter up and assist the miners would have murder upon his head. He did not believe in mincing matters. All know that the Government is controlled by one man, and the lives of those miners are in his hands. It rests with the people whether Mr. Dunsmuir is to have this control or not. If a man goes into the Legislature with an all powerful influence and works for his own personal advantage, he has betrayed the trust of the people who put him there.

Another miner addressed the meeting briefly after which the chairman invited the audience to come up and sign the petition. Eighty-three of those present responded to the call and signed their names.

The Unsafe Davy Safety Lamp.—According to Mr. A. H. Stokes, one of Her Britannic Majesty's Government inspectors of mines, the Davy lamp is no longer to be considered in the light of a safety apparatus, and from that point of view is henceforth to be regarded as useless. The Royal Commission appointed to report upon the "Mines Regulation Act," declared that the lamp is "unsafe in a current with a velocity of six feet per second, and, as Mr. Stokes says that the combined rate of the miner's walk and the necessary ventilation will constitute at least that amount of speed in the air, it must necessarily be banished from the mines. He adds that in his own experience many explosions and deaths have resulted from its use.

Mineral Output, 1887.

W. Hamilton Merritt, F.G.S., A.R.S.M.

Last year, in view of the absence of official statistics, I contributed a short paper to this section (a) on the mineral output of 1886. The statistics I collected were copied from *The Week* into *The Canadian Gazette* of London, Eng., which devoted a column to the subject, ending with the following:

Canada can point with pride to the fact that collections of her ores have taken the highest awards for quality and variety at many international exhibitions, while the encomiums passed by no less a British authority than Mr. Le Neve Foster upon the Canadian minerals at the Colonial Exhibition were evidence of the great value of the exhibits there displayed. Surely then it becomes of national importance that every facility should be provided for obtaining detailed and specific official information regarding the deposits, that they may be speedily developed. The Canadian Institute is not as yet a body whose voice will command the prompt attention of either the Dominion or Provincial Governments, but the cause it is forwarding is of such vital moment to the Dominion that we hope the authorities will take the matter in hand, and speedily pass into law such measures as will render possible the collection of reliable and concise information, and statistics relating to the mines, minerals and metallurgical interests of the whole Dominion.

Since the above was written we have been glad to welcome last month an advance guard to the expected, and hoped for, assistance from legislation in the shape of the statistical report on minerals for 1886, compiled by Mr. Eugene Coste of the Geological Survey. This doubtlessly is the result of a large and influential deputation of mining men and members of the House of Commons who gladly came together at my request to wait upon the Minister of the Interior at Ottawa in March, 1886. (See THE CANADIAN MINING REVIEW, March, 1886). And I think we shall be correct in giving our section credit for a recent Order-in-Council which has established a special section of the geological survey in accordance with our memorial presented to the Government last session, and following the lines laid down in the memorandum presented by the above mentioned deputation.

We must give the present minister credit for commencing the much needed reform, the desirability of which was laid before his predecessors without success.

The Departments of the Nova Scotia and British Columbia Governments, devoted to the mineral development of these provinces, are increasing their knowledge and efficiency as testified by their reports. Excellent work in acquiring information in connection with Ontario minerals is still being carried on by Mr. Blue of the Ontario Bureau of Industries.

We must welcome another important factor in the dissemination of information relating to our minerals and mines in the greatly improved condition in which THE CANADIAN MINING REVIEW of Ottawa has recently appeared. This journal has given our efforts, tending to the development of our mines and minerals, every assistance and has always supported the contention that extra legislation is advisable.

Among the public movements that concern our mineral developments the energy of the Toronto *World* deserves especial notice. This newspaper came to the inevitable conclusion that the Government of Ontario had been decidedly remiss in relation to the mineral development of the province, and has been doing excellent work in proving its point.

In view of the evident interest taken by our section last year in the statistical information contained in my paper of last year previously alluded to, I have again in a general way compiled from obtainable sources, a certain amount

of information in connection with the mineral output of the past year, 1887.

	Total.	British Columbia	N. W. T.	Manitoba	Ontario	Quebec	New Brunswick	Nova Scotia
Coal.....	1,998,080 tons.	413,370	60,000	.....	.....	.....	700	1,521,000
Gold.....	1,133,709 dollars.	\$793,709	.....	.....	.....	.....	34,525	\$500,000
Gypsum.....	193,375 tons.	.....	.....	.....	3,450	.....	.....	124,000
Iron Ore.....	73,347 " "	4,440	.....	.....	13,907	.....	1,066	50,000
Mar. gneiss Ore.....	1,889	.....	.....	.....	.....	1,385	.....	520
Copper.....	5,287	.....	.....	.....	3,874	.....	.....	6
Silver.....	214,837 dollars.	.....	\$1,452	.....	\$215,035	.....	.....	.....
Salt.....	65,800 tons.	.....	.....	.....	65,800	.....	.....	.....
Petroleum (crude) bls.	708,533	.....	.....	.....	708,533	.....	.....	.....
Phosphate.....	21,733 tons.	.....	.....	.....	733	21,000	.....	.....
Asbestos.....	4,500	.....	.....	.....	1,000	3,500	.....	.....
Mica.....	30,000 lbs.	.....	.....	.....	.....	.....	.....	174
Antimony Ore.....	174 tons.	.....	.....	.....	.....	.....	.....	.....
Pyrites.....	35,000	.....	.....	.....	.....	35,000	.....	.....
Plumbago.....	7,180 cwt.	.....	.....	.....	.....	.....	7,180	.....
Barytes.....	3,000 tons.	.....	.....	.....	3,000	.....	.....	.....
Sand and gravel, building stone, marble, grindstones, lime, granite, serpentine, slate, flagstones, bricks, tiles								
and miscellaneous clay products, say.....								
Export of produce of the mine for 1887 (from Dominion Trade and Navigation Returns):								
To United Kingdom.....								
United States.....								
Other countries.....								
Total.....	\$2,000,000.	.....	.....	.....	.....	.....	.....	\$3,805,959

The total export of the product of the mines for 1887, as given by the Trade and Navigation returns, was a little short of that record in 1886. In the aggregate the production of mineral does not seem to have increased materially—notwithstanding that the output of coal, iron, salt and petroleum was larger—but while the quantity mined in one or two products may have fallen off temporarily, the result of the past year's work shows that the mining at large has been persistently continued in every department, and that prospecting and preliminary development has made enormous headway, particularly in the Rocky Mountains, and Selkirk, in the Nicolet Valley region, and in the Georgian Bay and Lake Superior districts.

This fact, in conjunction with the awakening public interest, will without doubt very soon show remarkable results, and we may hope will place our mining industries on the permanent footing which they should undoubtedly occupy.

The Effect of Good Management on the Profits of Coal Mining.—The following extract from an article by Mr. André in a recent number of the *Colliery Guardian* is very suggestive and instructive: "The reforms introduced into the management of the Anzin collieries in the north of France in 1884, which occasioned the great strike and raised the ex-collier and tavern-keeper Basly to the position of a member of the French Parliament, are beginning to show themselves in larger dividends for the shareholders and better wages for the men. The efficiency of the miner, that is, the average annual production per man, has been raised in three year-

from 206 to 286 tons, and increase of 38.8 per cent. This important reduction in the cost of production has so improved the financial position of the company that they are able to prosecute vigorously the exploratory works that had been commenced in more prosperous days, and thereby gradually to increase the output. There are now eighteen pits being worked, the average annual output from each of which is 129,800 tons." Among our own colliers it would be easy to show the difference which good or bad management makes in the cost of production, and the data to make such comparison is generally to be found in the annual reports of the companies, though it can be brought out into relief only by careful analysis and comparison of statements.

Economic Minerals of Algoma and their Locality. (a₂)

SILVER—Native and Argentite—Silver Islet, Jarvis Island, Rabbit, Beaver, Badger & Silver Mountain, and Whitefish & Atik Lake districts, and combined with copper, nickel and cobalt on Michipicoten Isle, St. Ignace, Nipigon Bay, Princess and Thunder Bays, Sudbury, on line of C.P.R., also.

GOLD—Native in vein in Heron Bay on line of C.P.R., Prince's location, Huronian and Highland mines, Shebandawan, Lake Superior, and in several well defined veins near Rat Portage on Lake of the Woods.

GALENA—In string veins in Black Bay (Townships of McTavish, Dorion and McGregor), Princess and Thunder Bays, Lake Superior, and New Silver District, south-west of Port Arthur.

ARGENTIFEROUS GALENA—"Victoria" and Cascade mines near the Sault Ste. Marie and on Echo Lake, Thunder Bay, and in the new silver district south-west of Port Arthur.

LEAD—At Silver Lake, Thunder Bay, vein of quartz and barytes holding galena. "Enterprise," Black Bay, Pointe Aux mines, Pigeon and Kaministiquia Rivers, Lake Superior.

COPPER—Sudbury on line of C.P.R., Lake Superior, Spar Island, Prince's location (4 feet vein), vitreous sulphuret with silver. St. Ignace and Michipicoten Islands; combined native copper and silver. Michipicoten Island; bay and river combined copper, gold and silver. Mica Bay, Otter Head, Pic River, Montreal River, Battle Island, Nipigon District, Pointe Aux mines, Black River and Black Bay.

IRON—Specular Iron Ore—The Wallace mine on Lake Huron, Desert Lake mines, Bruce mines, and at Killarney, Nipigon and Michipicoten districts and north shore of Lake Superior, magnetic iron ore. North shore of Lake Superior and westward at Geneflint Lake and Hunters' Island, both magnetic and hematite.

NICKEL—Wallace mine, Lake Huron "3 A" mine, Prince's location and Michipicoten mines, Lake Superior.

BARYTES—Permanent white—Lake Superior in a multitude of veins along the north shore, between Pigeon River and Montreal River.

JASPER—Northwest of Thunder Bay, Batchawanning Bay and north of Lake Huron.

SERPENTINE—Nipigon River.

SANDSTONE—Red and Brown for building, on Nipigon Bay (Isles Verte and Le Grange.)

AGATES—St. Ignace and Michipicoten Island, Lake Superior.

AMETHYSTS—Thunder Bay, coast and islands, Lake Superior.

CHLORASTROLYTES or Cats Eyes—Isle Royale, Lake Superior.

BISMUTH—Thunder Bay (north of "3 A") and at Echo Lake, near Sault Ste. Marie.

ANTIMONY—North Shore, Lake Superior, Garden River and Echo Lake.

GAS, NATURAL—Thunder Bay, Lake Superior.

MARBLE—Lake Nipigon, Sunshine Creek, C.P.Ry. west of Port Arthur, and at Garden River and Echo Lake.

CHERT, RIBBOND (for cameos)—Thunder Bay.

COBALT (for glass staining and porcelain painting, etc.)—Thunder Bay, Lake Superior.

RETINITE, PITCHSTONE and BASALT, (for making black glass)—North Shore of Lake Superior, between Nipigon and Michipicoten. Limestone (pure), Flack Bay, Echo Lake and northwestward from Thunder Bay, L.S.

WHITE QUARTZ SANDSTONE (for making glass)—North shores of Superior and Huron.

ALUM—On Slate River, Thunder Bay, Lake Superior.

SEATITE OR SOAPSTONE—Near Thunder Bay.

FLAGGING SLATE—Sawyer's Bay, Thunder Cape.

MOLYBDENUM (for dyeing purposes and calico printing.)—Terrace Bay and in certain rock cuts on C. P. R. road, north shore of Lake Superior.

ARSENIC—In various places on north shore of Lake Superior.

ROOFING SLATES—75 miles west of Port Arthur on C.P.Ry., on the Montreal River.

MANGANESE—North shore of Lake Superior at different places.

GYPHUM—North of Michipicoten and on the Moose rivers.

MICA (marketable)—On the Lake of the Woods east of Rat Portage, and within 20 miles of Port Arthur, Lake Superior.

LIGNITE—On the Rainy River, near Fort Francis, and on the Albany, north of Lake Nipigon.

TELLURIUM (a rare combination of gold and silver) found in the Huronian mine near Port Arthur.

ZINC—In immense deposit near Ross Port on the line of the C. P. R. east of Port Arthur.

FIRE CLAY and KAOLIN—Near Thunder Bay and Peninsula Harbor.

ASBESTOS—North of Poplar Lodge, Lake Nipigon, and near the mouth of Nipigon river.

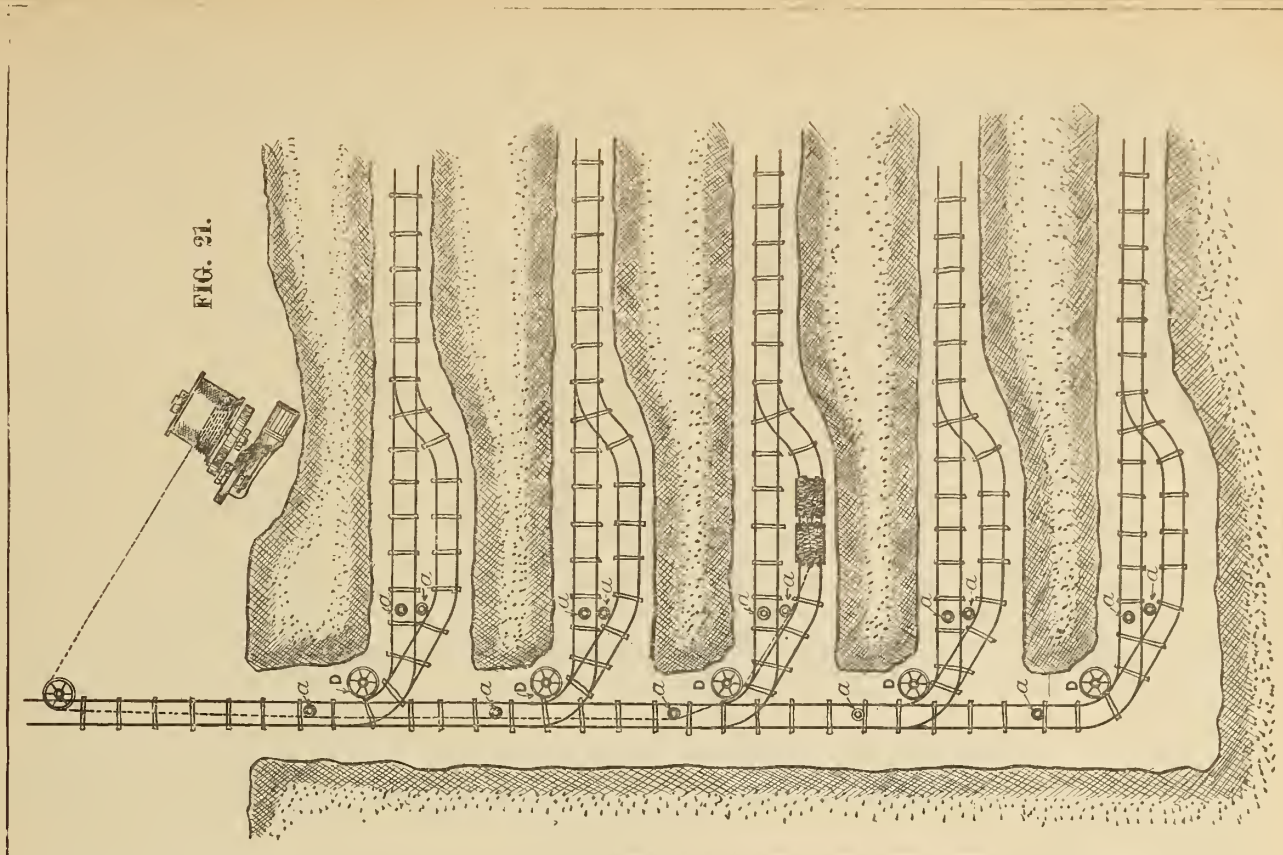
Colliery Cage Props.—According to A. Demeure, at No. 5 pit of the Bascomp Collieries, the cages are double-decked, carrying two tubs on each deck. At the bottom of the pit they are received on a platform balanced so as to support the weight of the cage and empty tubs, but to sink when a loaded tub is run on, the movement being controlled by a powerful brake, so that the change of position is conducted independently of any handling of the engine. Meanwhile, the cage at bank has to be (1) raised, (2) lowered on to the props with the top deck level with the bank, (3) raised until the lower deck is slightly above the props, (4) lowered on to them, (5) raised to allow them to be withdrawn, (6) lowered away. In English practice, this would usually be conducted in the reverse order, the cage being (1) completely raised, (2), bottom deck lowered on to props (5) raised clear, (6) lowered away. In each case the engine has to be reversed five times. It was found that the cage at bottom was always loaded and waiting before the cage at top was ready, and it was to accelerate the latter that the Stauss system was adopted. In this system the catches are somewhat in the form of short bolts, resting on a steel bar or frame, the upper surface of which has an inclination of about 9°.

These bolts are hinged so as to give way to the upward passage of the cage, and are connected to the hand lever by a sort of toggle-joint which locks them into position, so that the weight of the cage applied on their upper surface cannot possibly force or slide them back, while, owing to the inclined surface on which they rest, they can be easily withdrawn by the lever without the necessity of first lifting the cage. The cage is (1) completely raised, (2) lowered until the bottom deck rests on the props, (3) the props are withdrawn and the cage lowered until the upper deck comes on to the props, (4) the props are finally withdrawn and the cage lowered away, the engine being reversed once. Mr. Stauss claims five distinct advantages for his apparatus:—(1) Economy of time. Experiments show that in the case above given this amounts to 13 per cent., with a corresponding increase in the amount of coal that can be drawn in a given time. (2) Economy of steam, as each reversal of the engines means an additional stroke of the pistons. (3) Less wear and tear of the rope. (4) Less wear and tear of the valve gear and moving parts of the engine. (5) The possibility of employing smaller engines, an advantage open to considerable question. In the case of existing plant, the size of engine cannot, of course, be reduced, and in putting down new plant the engine should always be powerful enough, in case of need, to raise the loaded cage unassisted by the partial counterbalance of the empty one. In cases where there is no balanced platform, the Stauss system is not so applicable (except in the case of single decked cages, where the gain is not so apparent), as it is only advantageous where the cage is changed by successive descents; and while the cage at bank is thus descending, the one at the bottom would, if worked simultaneously by the engine, by ascending stage by stage. Moreover, the rope must be kept taut, so as to avoid an undue shock when the cage is dropped by withdrawing the catches; and this manifestly cannot be done with both cages at once. As a necessary precaution, when the pit is standing, the hand-lever must be locked or chained, so that the catches cannot be willfully or accidentally withdrawn; and should the engine-man have occasion to leave his engine, he must always put the brake hard on.

Accidental Mining Success.—A rather strange and remarkable story is told in Idaho in connection with one of the principal gold mines of that territory. It is stated, says *Mining Industry*, that two daring and unscrupulous fellows, one having a rather creditable acquaintance in London, conceived the idea of floating a mining venture in England. The basis of operations was a 10-foot assessment hole, sunk on a worthless quartz vein. Artistically executed maps and plates of an ideal vein with workings were gotten up, together with views of a mill belching forth steam and smoke, and surrounded by innumerable quartz teams and the conventional piles of cordwood. The sanguine promoter of the enterprise then started for Europe and unfolded his great mining scheme, while his partner worked the wires from this side. The swindling pair were successful in catching a few fools, and securing a little money. Every week the "superintendent" telegraphed the results of the clean-up from the plates and mortars of the imaginary mill, and promptly returned the money received from stock sales by this promoter as the amount realized from the disposition of gold bars. Dividends were declared, the stock was advanced in price, and the Englishmen felt greatly

elated over their venture. It proved a picnic for the American partner in the scheme, but the promoter of the enterprise in England became frightened at the magnitude of the swindle and dreaded a final exposure and the consequent results. He wrote to his confederate in Idaho to look about and buy a mine for the company with a portion of their profits, which were now very large. A mine answering the description was not, however, so readily found, and especially as the man in Idaho was rather indifferent. Finally the climax began to approach when a few of the directors of the company announced their intention of visiting America and inspecting their wonderful bonanza. This brought the situation home to the "superintendent," who, at the urgent demand of his associate in England to protect himself, lost no time in scanning over the country for a suitable property. Finally one was found that very nearly answered the description of the visionary mine, and it was purchased, and in a few months it was made to conform in all essentials to the description forwarded, even including good ore faces, as new strikes were made that surprised everyone. When the promoter arrived with his party of Englishmen he was the most surprised and delighted man in the company, and the exchange of congratulations between the two partners was an event that neither will forget. The mine not only held out well, but continued improving, and paid dividends regularly, and is to-day one of the best gold properties in the Territory of Idaho. The Englishmen, it is stated, never learned of the deception practised on them, and would to-day invest a million pounds sterling upon the recommendation of the promoter; but the latter is making money enough out of the strangely acquired mine, and would not go through the experience of selling an imaginary mine again unless, perhaps, he should get broke once more.

Electric Coal Cutting Machine.—The application of an electric motor to impart motion to coal cutting machinery is proposed by Messrs. Bower, Blackburn & Mori, of Woodlesford, Yorkshire. The frame work or bed-plate of the machine is supported on wheels. Within the frame work is mounted or applied the electric motor, which may be of any suitable construction, and to this motor the electric motive force is imparted through suitable cables from a dynamo machine of any suitable tension. A rotary motion is transmitted to the shaft carrying the cutter bar through gearing. The lower part of the frame work, to which the upper part of the frame work is attached, forms a circular turntable, and is fitted so as to be capable of a rotary movement on the bed-plate, this rotary movement being effected by means of a worm, mounted on a shaft supported in the bearings, attached to suitable brackets, mounted on the bed-plate, and worm-wheel segment attached to the upper part of the frame work. By this means the cutter bar can be moved along by the attendant as the coal is being cut, and the proper feed given thereto. Although by preference the motor is carried on or attached to the coal cutting machine, the inventors would have it understood that such motor may be placed at any convenient distance therefrom, and motion transmitted from such motor to the machine by belt, chain, rope or other gearing, or by storage transmission or static induction. Suitable means may be employed for regulating the speed of the motor, and thus varying or adjusting the speed of the coal cutting machine.



Wire Rope Haulage and its Application to Mining.

By Frank C. Roberts, C.E., Philadelphia, Pa.

Continued from February Issue.

Having described the most important mechanical devices common to engine and gravity-planes, I will now consider the distinct features of each.

II. *a.* ENGINE-PLANES.—Planes of this class, especially when underground, are often denominated *slopes*, and are naturally divided into single and double slopes. In the former hoisting and lowering are distinct and separate operations, performed upon a single track (Fig. 7). Double slopes, on the other hand, provide for hoisting and lowering at the same time, and consequently necessitate three or four lines of rails (Figs. 8, 9 and 10).

On single engine-planes it is usual to employ a non-reversing engine, and, as in the case of the

single hoist, the slope may be operated by employing the power of the engine but one-half the time. In such instances the empty cars are allowed to descend by gravity, the drum running freely on the shaft for the time and being controlled by a strap-break or friction clutch. It is sometimes convenient to locate the engine at the foot of the plane, the hoisting-rope being supported along the side of the slope by rollers (Figs. 15 and 16) and led to the head of the plane, where it passes around a wheel of large diameter and, returning down the track, is attached to the car.

The single-slope system is peculiarly applicable where there are a number of side-entries located at different levels below the surface. In this case the train of descending cars may be stopped at the entry into which it is desired to switch some of the trucks, the train in the meantime being prevented from premature starting by a lock consisting of a timber pivoted and thrown over the rails. When the disconnection has been made, the signal is given and

the train descends to a lower level, where the operation may be repeated. In hoisting to the surface, the cars in the various side-entries are run to the main entry and, in a manner similar to that above described, switched to the main slope and connected to the rope.

An improved modification of the single plane is illustrated in Fig. 21. Here, for the accommodation of the empty or loaded cars, each side-entry has its individual parting or siding placed near the main entry, and in this way the plane is practically divided into as many separate planes as there are entries. Loaded cars are taken from each entry in succession, and the empties returned in the same order, the position of the end of the rope being indicated to the engineer by marks upon the rope, or better, by an indicator attached to the drum. Proper switches, etc., are located at the desired points, and the rope is guided into the entry by drums *D*, placed in the angles as shown. These drums have a face of two and a diameter of five feet. Guide rollers, *a*, are placed at suitable points.

Double Engine-Planes.—In double engine-planes, engines similar to those employed in double hoists are used, requiring, of course, reversing-gear and an efficient brake. The operation of these planes differs from the preceding only in the detailed arrangement of switches, sidings, etc. These devices may be readily understood by an examination of the various track-systems and other expedients already described.

II. *b.* GRAVITY PLANES.—The valley of the Monongahela is celebrated for its gravity-inclines. Here the mine-adits are located at a considerable elevation above the railroads, the incline from the pit-mouth to the railroad being of such a degree that loaded mine-cars, descending by gravity, raise a corresponding number of empty cars. To this application of natural force the name "gravity-plane" has been given. Perhaps to the ordinary observer the profile of the gravity-incline is a matter of small moment, and yet this factor is important in securing a satisfactory operation. The plane should be slightly concave. Theoretically the curve is a

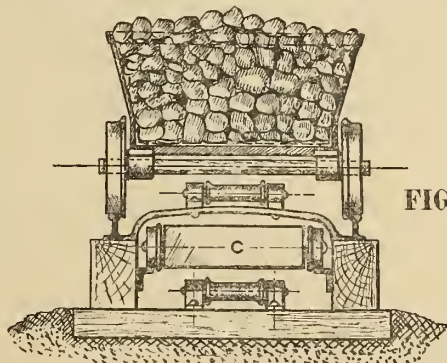


FIG. 22.

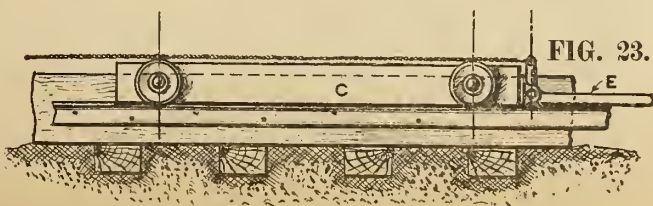


FIG. 23.

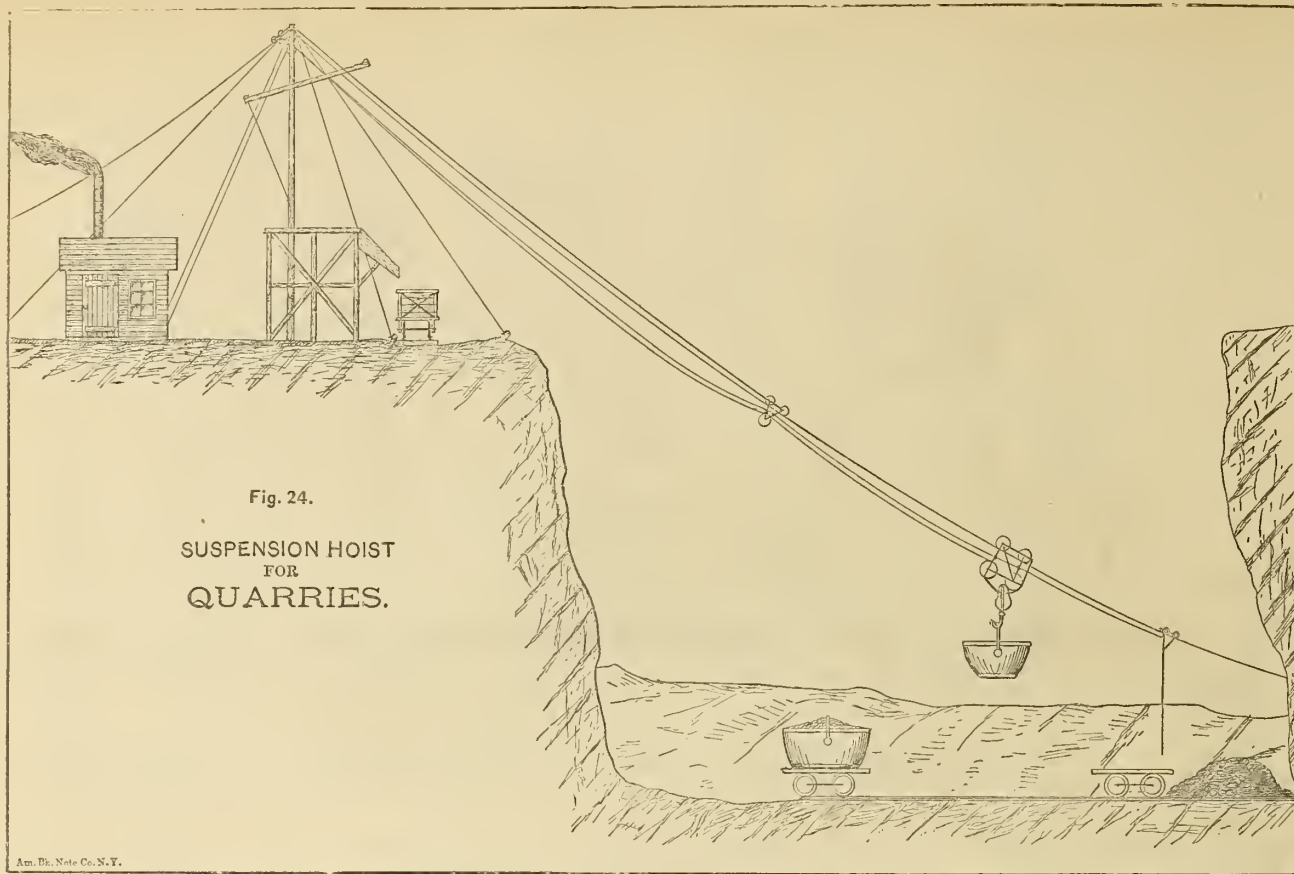


Fig. 24.

SUSPENSION HOIST
FOR
QUARRIES.

Am. Br. Note Co. N. Y.

cycloid, the peculiar property of this curve being that a body falling along its lines will reach the lowest point of the plane sooner than by any other course, straight or curved. It can also be demonstrated that when the cycloid is employed, the weight of the two ropes is equalized at every point, so that the resistance from this cause is constant. On a straight incline a variable breaking force is required; but on a cycloidal incline the brake may be applied with equal force during the whole time of descent, and a uniform rate of motion insured.

It would, of course, be a difficult matter to build the profile of a plane so as to conform to cycloidal lines; but, for the reasons mentioned, it is advisable to approach as nearly thereto as possible.

The various track systems common to both engine and gravity-planes have been described above; but while the three and four-rail systems are similar in principles of operation, the single-track system (Fig. 7) as applied to gravity planes is modified to such a degree as to require special consideration. This modi-

fication consists in employing two tracts of different gauge, the narrower being placed within and below the wider (Figs. 22 and 23). The wider track is for the pit-cars, while the narrower serves as a roadway for what is termed the balance car, C. The latter is so proportioned in weight that it is sufficient to raise an empty car, and light enough to be elevated by the descending loaded car. To the balance car is attached a safety catch E, as shown in Fig. 23. When the rope breaks, or through any means becomes slackened, the lever E drops, and com-

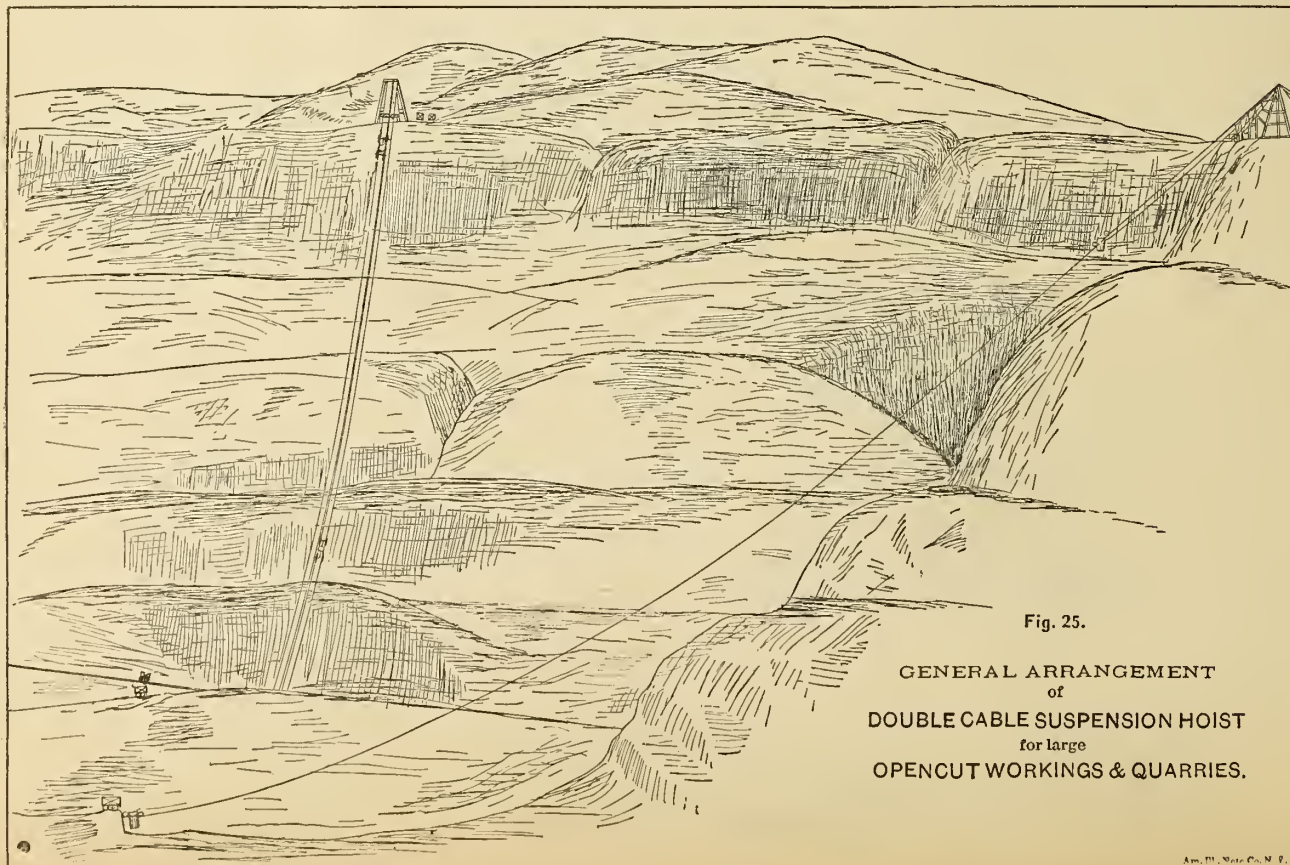


Fig. 25.

GENERAL ARRANGEMENT
of
DOUBLE CABLE SUSPENSION HOIST
for large
OPENCUT WORKINGS & QUARRIES.

Am. Br. Note Co. N. Y.

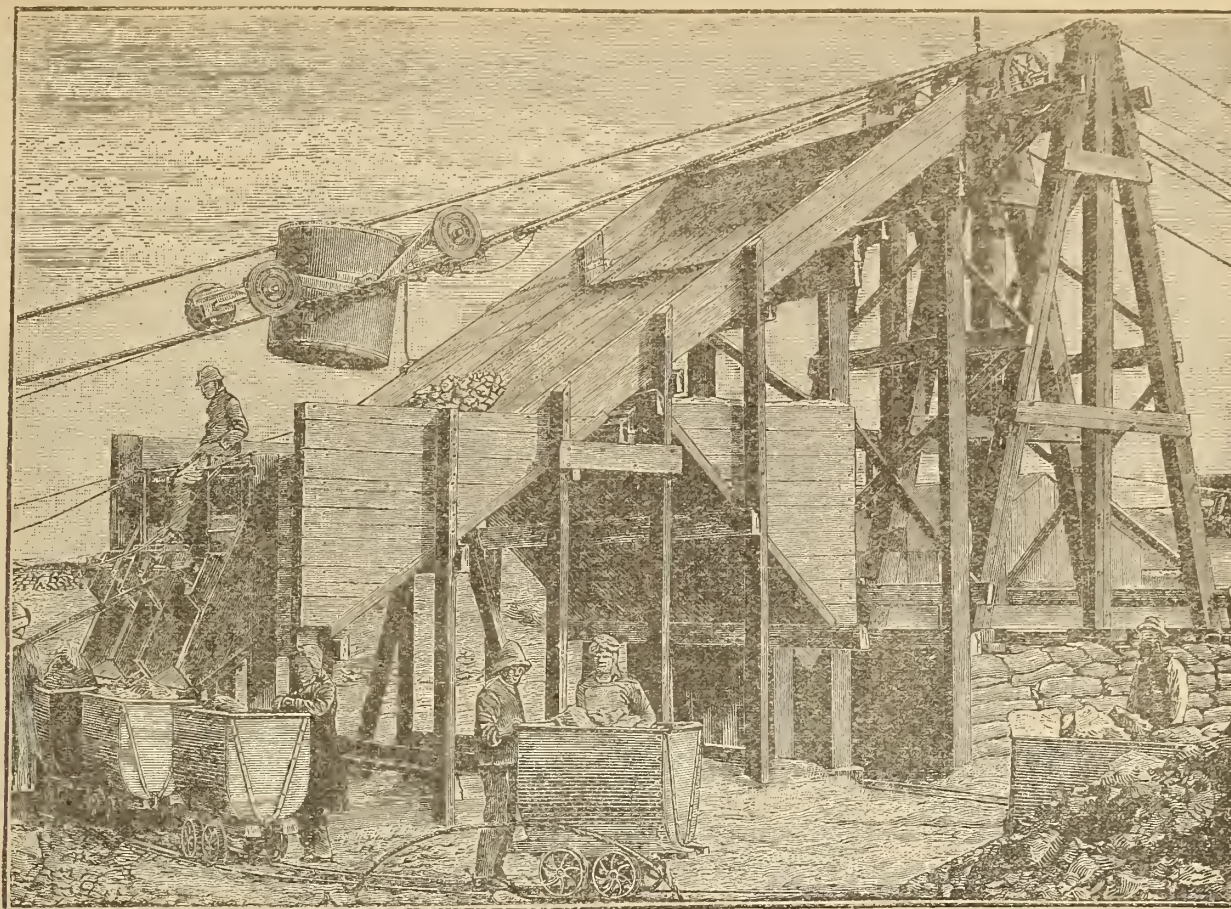


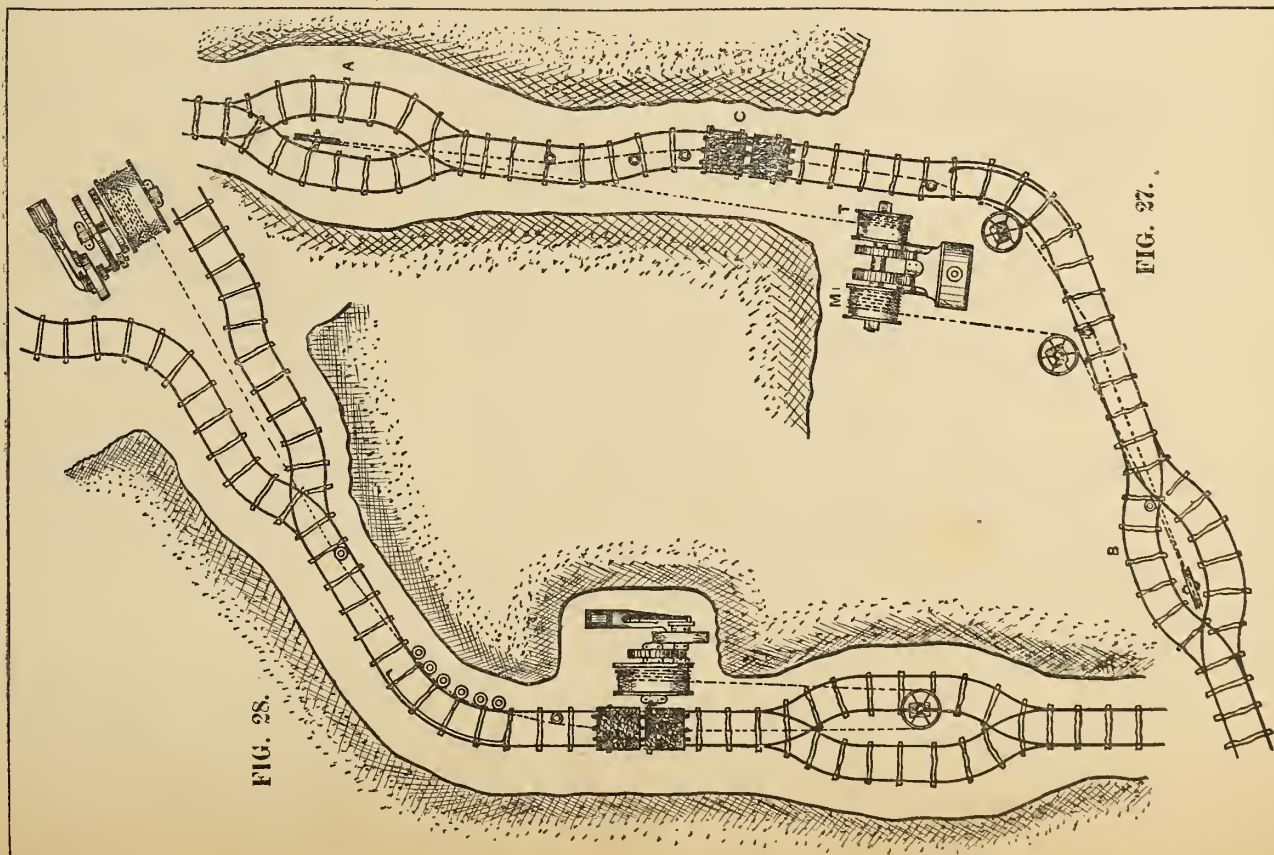
FIG. 26.—Arrangement of Terminal for Double Cable Suspension Hoist.

ing in contact with the ties of the road-bed, prevents rapid and dangerous descent.

Gravity-planes are operated by either one or two wire ropes. Where a single rope is employed, it receives three or four turns around the head drum, in order to prevent slipping, and the ends are attached to the empty and loaded cars respectively. (In the single-track system one end is, of course, attached to the counter-

balance car). This arrangement is very crude and not to be recommended under any circumstances. There is an unavoidable sideward movement in the rope, which not only causes great inconvenience but is also the source of rapid wear to the rope. Where the employment of a single rope is necessary, it will be found more advantageous to employ a standard wire-rope grip-sheave. The latter consists in

an iron sheave, having its rope-seat composed of a number of hinged segments. These are arranged in such a manner that the pressure of the rope causes the upper part of the segments to close and grip the rope. The preferable method, however, is to employ two ropes. These may be operated in various ways. In the first instance, we may employ one drum, the rope winding and unwinding from opposite ends,



or again, we may have two smaller drums keyed to one shaft, each having its own rope. Both these expedients require that the two ropes shall pass off at opposite sides of the drum *i. e.* one at the top and the other at the bottom. Where economy of space is requisite at the heading, this becomes a very inconvenient arrangement. In order to avoid this difficulty two drums mounted on separate shafts and connected by gear wheels are used. In this manner it becomes possible to lead both ropes from the under or top side of the drums as may be desired. The most complete device is to employ two fusee-drums, placed end to end on one shaft with the brake-seat between them. These may be located at some distance back from the head of the incline. Two head-sheaves are here employed, over which the rope passes and continues down the incline.

In all gravity-planes it is necessary to employ a brake-apparatus attached to the rope drum in order to check (*b*) the speed of the descending cars. Any approved brake may be used for this purpose, care being taken to apply a device that may be operated speedily and with

little exertion. The speed of the drums must be entirely under control. The same precautions should be taken in proportioning a wire rope, to be used on inclined planes, as have been specified under hoists. Wire rope of six strands of seven wires each, laid about a hempen centre is the most serviceable on inclined planes. The wire in this grade of rope is coarser than in the 19-wired rope and is consequently better able to withstand the rough usage and surface-wear encountered in this application.

Fig. 39 illustrates the most approved design of swivel-chain-connection between the wire-rope and cars on inclined planes.

The stress in the rope when applied to inclined planes is dependent on the inclination to the horizontal. The following table will be of assistance in determining the stress; but it must be borne in mind that, while the table is based upon an allowance of 40 pounds per ton, for rolling friction, there will be an additional stress, due to the weight of the rope, proportional to the length of the plane.



Du Lievre.

Nothing could be more encouraging than the present outlook of the phosphate industry in this district. All the mines are being vigorously developed, giving employment to a large force of miners and laborers, and ore is being brought to the surface in great abundance. The mines have never been so productive as now, and when navigation is open many thousand tons of rich ore will be ready for shipment. There can be little doubt that the output during the coming season will be far in excess of any former year.

Frequent reference has been made in these columns to the constant improvements which have been made at the various mines, but at none of them are these more striking than at High Rock—one of the most productive properties in the district. The buildings, which include among others, commodious boarding and store-houses, stables, blacksmith's and machinist's quarters, and a very commodious and substantially built manager's dwelling and office, will shortly be augmented by the erection of twelve new tenements for the accommodation of the largely increased force to be put on during the coming summer. In the large tunnel (No. 11 pit) a staff of 100 men and four drills are taking out about 15 tons of ore per diem. The other pits on the top of the hill continue to turn out satisfactorily. In the cobbing houses another 52 men and boys are employed in connection with the recently introduced ingenious system of cleaning up the fine phosphate. This system, which was fully described in our December issue, continues to give every satisfaction: double the quantity of ore being separated from foreign matter in less than half the time taken by the old process, and as much as forty tons has been cobbled in one day by these large circular screens. About 2,500 tons of first class ore are now awaiting transportation. Mr. W. W. Pickford proposes to bring out from England a large number of miners during the summer, and an endeavour will be made to increase the force to at least 300 men. A little village of 35 families has sprung up in connection with these extensive mines.

Mr. Patrick Smith, the genial mine superintendent at High Rock, has been suffering from an old accident to his foot, and has temporarily resigned his position for a few weeks in order to seek medical treatment in Montreal.

James McCabe is preparing to take out a large quantity of phosphate from his mine on River du Sour, as he expects that the L. R. locks will be finished this year, thus allowing steamers to run to High Falls and leave him but one day's hauling from the mine, which is but a mile or two from Messrs. Ross Bros.' Ox Bow Farm.

Mr. Stewart is putting up a house on his lot near High Falls. He will open out a number of shows this spring. This gentleman owns quite a number of mining lots above the Chute.

Mr. S. P. Franchot reports that very satisfactory progress is being made at both the Emerald and the Central Lake Mines.

Stress in Hoisting Ropes on Inclined Planes of Various Degrees.

Rise per 100 ft. horizontal.	Angle of Inclination	Stress in pounds per ton of 2,000 lbs.	Rise per 100 ft. horizontal.	Angle of Inclination	Stress in pounds per ton of 2,000 lbs.
Ft.	°		Ft.	°	
5	2 52	140	105	46 24	1484
10	5 43	240	110	47 44	1516
15	8 32	336	115	49 00	1535
20	11 10	432	120	50 12	1573
25	14 03	527	125	51 21	1597
30	16 42	613	130	52 26	1620
35	19 18	700	135	53 29	1642
40	21 49	782	140	54 28	1663
45	24 14	860	145	55 25	1682
50	26 34	933	150	56 19	1699
55	28 49	1003	155	57 11	1715
60	30 58	1067	160	58 00	1730
65	33 02	1128	165	58 47	1744
70	35 00	1185	170	59 33	1758
75	36 53	1238	175	60 16	1771
80	38 40	1287	180	60 57	1782
85	40 22	1332	185	61 37	1794
90	42 00	1375	190	62 15	1804
95	43 32	1415	195	62 52	1813
100	45 00	1450	200	63 27	1822

I append also a table (Trenton Iron Co.), giving the various data necessary to select a wire rope to meet specified requirements.

Description				Iron.			Steel.		
Trade No.	Diameter in inches	Circumference in inches	Estimated weight per foot in pounds	Breaking stress in tons of 2,000 pounds	Proper working load in tons of 2,000 pounds	Circumference of hemp rope of equal strength	Breaking stress in tons of 2,000 pounds	Proper working load	Circumference of hemp rope of equal strength
11	1 1/8	4 3/8	3 37	36	9	10 3/4	88 38	22	16 3/4
12	1 1/4	4 1/2	2 77	30	7 1/2	10	67 2	16 8	15 1/2
13	1 1/2	4 3/4	2 28	25	6 1/4	9 3/4	60 67	15 2	15
14	1 3/4	5 1/8	1 82	20	5	8	39 84	10	11
15	1 7/8	5 3/4	1 50	16	4	7	31 82	8	9 1/2
16	2	6	1 12	12 3	3	6 1/2	24 7	6 2	8 1/2
17	2 1/8	6 3/4	0 88	8 8	2 1/2	5 1/4	18 48	4 6	7 1/2
18	2 1/4	7	0 70	7 6	2	5	16 32	4	7
19	2 1/2	7 1/2	0 57	5 8	1 1/2	4 3/4	12 44	3 1	6
20	2 3/4	8 1/4	0 41	4 1	1	4	9 33	2 3	5 1/2
21	3	9	0 31	2 83	3/4	3 1/2	6 89	1 7	4 1/2
22	3 1/8	9 3/4	0 23	2 13	3/4	3 1/4	5 23	1 3	3 3/4
23	3 1/4	10 1/4	0 19	1 65	3/4	3 1/2	3 93	1	3 1/2
24	3 1/2	11 1/4	0 16	1 38	3/4	3 1/2	3 25	81	3
25	3 3/4	12 1/4	0 125	1 03	3/4	3 1/2	2 96	75	2 3/4

(To be continued.)

It may interest our readers to know that the exact quantity of ore shipped from Buckingham station last year amounted to 12,900 tons, as follows:—

	Tons.
High Rock.....	5,000
Dominion.....	2,600
Ottawa Phosphate Co.....	2,400
Union Mining Co.....	1,700
W. A. Allan.....	600
Lomer, Rohr & Co.....	600
Total.....	12,000

Preparations for a very active season are being made at the mines of the Canadian Phosphate Company. Arrangements are nearly completed for the construction of a tramway to the river's bank, and increased accommodation is being provided for the largely increased force which will shortly be put on by the new company. Captain Smith informs us that three new boilers and other machinery is to be put in, and everything done conducive to a large output during the coming season. A little over 120 men were employed last month.

The directors of the new company are:—Ed. Packard, jr. (Messrs E. Packard & Co., chemical and superphosphate manufacturers, Ipswich and London, and managing director of the Ulster Manure Company, Londonderry), chairman; W. H. Williams, President of the Vendor Company, New York; Thos. Oakeley, 2 Lombard street, London, E.C.; W. E. Couper (Messrs. Couper, McCarnie & Co.), 1 Fenchurch Avenue, London, E.C.; C. C. Hoyer Miller, Montreal and London. As has been already stated in these columns the agents of the corporation are Messrs. Miller & Co., Custom House Square, Montreal.

Mr. F. Stacey Shirley writes regarding his new process:—"Regarding the soluble product referred to, and about which I wrote you some time ago, the experiments are proving to be highly valuable, but a little too powerful to be used in great quantities, its extra strength will, therefore, be a feature for economy. I am getting some points together as testimony to the value of the plain raw phosphate, but only want such as is authenticated. If not in time for this issue, will send you full particulars for next after."

Some of the leading men interested in the Du Lievre Milling and Manufacturing Company are:—E. F. Childs, Congress street, Boston; F. S. Arnold, Providence, R.I.; W. H. Lum, New York; and F. Stacey Shirley, New Bedford, Mass.

Nothing of importance has taken place at the North Star Mines during the month. The mineral already shipped from this mine is of an exceptionally high grade, and in this particular there is no falling off in that which is now being raised. Like the others, arrangements have been made for a very large output during the summer.

Messrs. Poupore & Co. are pushing rapidly forward with the construction of the new lock and dam at Little Rapids—a work of immense importance to the miners on the river. A very substantial and commodious house has been erected for the lockmaster, and between 50 and 60 men are now employed on rock work, and on the retaining wall. Mr. F. M. Hamel is the engineer in charge.

Matters are very quiet at Little Rapids, and will continue so for a few weeks yet. As soon as the season opens the force will be increased and work conducted vigorously again. During the autumn much new ground was prospected and many promising deposits discovered. There is a large amount of reserve ore in sight on this valuable property.

We understand that Mr. A. F. Macintyre, of Ottawa, will do some work this summer on his lots immediately adjoining the Emerald Mine. On all of these lots a good deal of prospecting has been done. The soil has been stripped off in patches and also trenched in various directions, so as to expose the solid rock over an area of about three acres on the side of a south sloping hill about 200 feet high. The country rock is here the same as at the principal phosphate mines in the district. There is also a nearly white rock, pitted with small holes on the surface, which is regarded as a good indication in this region. In all the strippings and trenches green phosphate has been found. On the other lot, within a few yards of the Emerald property, among others, an opening eight feet long has been made into the rock, exposing a vein of solid green phosphate. A shaft has also been sunk to a depth of 25 feet, cutting through an inclined vein of green ore, with an average of about a foot as seen in the shaft. Several other openings also show very rich indications. An eminent geological expert writes thus about it:—"The phosphate deposits of the Emerald Mine, adjoining this part of the above lot, all run directly into it, and, judging by the forms of the excavations which have been made, in working downward their tendency is to increase in size in the direction of this property."

The manager of the Phosphate of Lime Company is going to build twelve new dwellings at the mines, and has already made arrangements for the delivery of the lumber requisite.

We have to express our thanks to Mr. W. W. Pickford, jr., Captain J. E. Smith, and Mr. Neil Cochrane for their extreme courtesy and kindness to our representative during a recent visit to these mines. Their generous hospitality will not soon be forgotten.

The attention of our readers is directed to the advertisement of Messrs. Dick, Ridout & Co. of Toronto. Miners in need of bags for their phosphates, cannot do better than give these celebrated manufacturers a trial.

Templeton District.

Visitors from the Blackburn Mine state that a very large quantity of very fine ore is on the dumps awaiting shipment.

The new machinery put in on the Templeton and Blanche River Company's property (the old Perkin's) is giving every satisfaction, and will largely increase their output.

Perth District.

Captain R. C. Adams, managing director of the Anglo-Canadian Company, who has been in England during the past few months, sailed from London on the 3rd inst. The snow has retarded operations at the Otty Lake mines, but Dr. Penrose states that everything is in good shape for extensive operations as soon as the season opens.

Kingston District.

Superintendent Harris and a large force are making very satisfactory progress with their Blessington mines. Increased accommodation is being provided for the largely increased force to be shortly added.



We shall be greatly obliged to mine owners and superintendents for such authentic reports of their operations as may concern shareholders and the public.

Nova Scotia.

The annual general meeting of shareholders of the Intercolonial Coal Co. (limited) was held at Montreal on the 7th instant.

The extreme scarcity of railway rolling stock continues and much dissatisfaction exists at the various collieries on this account. The output of coal in consequence is very much reduced.

The Drummond Mine is working daily, and when cars are not to be had the coal is banked. As soon as the summer shipments begin the large pile at present existing will very rapidly disappear. The company contemplate the reopening of their No. 4 slope, from which they will extract pillars. A hauling engine has been put down in their Scott pit, and the sinking of the slopes, in order to prove the quality of the coal, is being proceeded with.

The slopes of some of the provincial collieries are assuming great length. The main slope of the Drummond Colliery is over 3,300 feet long, that of the Acadia over 3,100 feet, and of the 'Vale' 2,600 feet. The 'Syndicate' slope at Spring Hill is down 2,000 feet. It is proposed to add 1,000 feet, which will make it 3,000 feet in length.

The Black Diamond Mine, formerly owned by the Nova Scotia Coal Company, has been reopened by a party of New Glasgow capitalists, who will put forward every endeavour to operate the mine successfully. This mine has been closed for a number of years. It is hoped the new company will meet with the success they deserve.

At the Albion Mines, the Acadia Coal Company (limited) are making preparations for the reopening of at least one of the slopes which have been closed since the explosion of 15th January. An effort will also be made to sink a slope to the deep of the famous Cage pit seam, and at the same time avoid contact with the old workings. It is also understood that the draining of the Foord pit is to be continued. With these works once more in operation, trade will boom at the Albion mines.

At the Vale Colliery a plentiful supply of cars appears to be all that is requisite to make things lively as the "McBean" and "Six Feet" seams are both being worked vigorously. There has been a large influx of Belgian miners, and from latest reports, more will soon follow.

At little Harbor, where prospecting has been carried on for some time past, a three feet seam of coal has been discovered. The parties conducting the work are confident that the seam will increase in thickness towards the deep, and they are in hopes that it is underlain by a larger deposit.

Nothing further has been heard of the reported discovery of coal at Antigonish, and little importance is now attached to the rumour.

The estate of the Steel Company of Canada, Londonderry, N.S., has been transferred to the Londonderry Iron Company of that place, by whom the business heretofore carried on by the Steel Company will be continued.

Official returns of gold crushed for February are :—

District.	Mill.	Tons Crushed.	Ounces Gold.
Whiteburn	The McGuire	34	142½
Waverly	Wallace (old Berkner)	5	2½
East Rawdon	J. Nichols	140	70
"	Rawdon United	280	78½
Dars' Hill	Dufferin	870	447
Stormont	Tributers	61½	83
Sherbrooke	Goldenville	11	13½
"	Pactolus	50	8½
"	Miurs	200	35
Lake Catcha	Oxford	131½	379½
The following are additional returns for January :			
Dars' Hill	Dufferin	754	376
Brookfield	Brookfield	90	81

A miner named Alex. Fraser, working in the east mines of the Londonderry Iron Co., was crushed to death by a heavy fall of earth on the 6th instant. This appears to be a case for the mine inspector to investigate.

"We learn from a gentleman living at Sydney, C.B.," writes the *Critic*, "that a valuable seam of superior coal, five feet in thickness, has just been discovered near Fortune's Brook, south of the property formerly belonging to the Toronto Coal Company, and a little to the west of the seams that have been worked. It is close to a shipping place on the Bras d'Or.

New Brunswick.

Negotiations for the sale of the Stockton Manganese Mine are nearing a successful completion. The price to be paid for the property is \$55,000.

Prospecting for coal is being carried on near Shaw's Mill, Dunsonane, on the line of the I. C. R.

Mr. F. J. Alley's Manganese property at Glebe, Dutch Valley, will be vigorously worked in the spring.

One of the principal sources of manganese ore at present, is to be found on the properties of the Queen Manganese Mining Company at Markhamville, where very extensive "pockets" of ore have been opened. The following figures have been officially reported to us : Quantity ore mined in 1887, 813 tons of 2,240 lbs.; sold for blast furnace use and shipped to England, 505 tons; to United States, 53 tons; ore prepared for consumers' uses in chemical and manufacturing industries in the United States and Canada, 243 tons; average number hands employed in mines, 20; average number hands in works, 30.

Mr. D. Andrews, superintendent of the Moose Brook Manganese Mine writes: "I have sunk the shaft 35 feet deep, also drifted 12 feet east and west, and the changes are for the better. If it continues good going west, I shall have to sink the shaft 10 feet deeper in order to give us a chance to have the greater part of next month's work in backstopping, that means to be below our work, so that all the ore and rock will be much easier handled, and at less expense. I will continue taking out ore this month, then I shall sink and drift; that will probably take the best part of three weeks, and in so doing we will be prospecting new ground. Everything points that by sinking we shall strike new deposits. The ore that you saw on the dump looked

splendid after the rain, in fact much better than I expected to see there."

Mining licenses have been recently sold in the northern portion of New Brunswick on Crown Lands, and it is said valuable deposits of galena, manganese and iron exist thereon.

The Stockton manganese mine is about being placed in Baltimore, says the *Halifax Critic*, and no doubt vigorous measures will be taken to develop and ship the ore in large quantities. The price to be paid for the property is \$55,000.

Quebec.

The Graphite City mill is at a standstill.

Under the able superintendence of Mr. Neil Cochrane very satisfactory headway is being made at the British and Canadian Mica Company's mines. Mining both in the tunnels and on the outside of the hill is very systematically conducted, and a large quantity of very superior mica is being taken out and made merchantable. Since our last an enormous crystal weighing fully 280 pounds has been taken out. The demand for the product continues good, and Mr. Von Rehm, the manager, reports a brisk business at the Buckingham office.

At Black Lake the Anglo-Scotch Asbestos Company is building a factory and putting in machinery to crush their asbestos rock instead of cobbling it. There are a number of dwelling houses going up. The company have employed 15 men all winter, the average output being 1½ to 1½ tons per day.

Many improvements are being made at the Capelton Copper Mines, of which particulars will be given in these columns in a future issue.

The Hon. J. G. Ross, Quebec, Hon. J. A. Chapleau, Hon. Geo. Irvine and many other prominent men are largely interested in the asbestos industry.

Ontario.

We understand that negotiations are in progress for the sale of the Frontenac mica mine. This property is located on lots 4 and 5 in the 11th ranges, Township of Miller, and is favorably spoken of. A report on the property states: "The position of the mine is a gully between two mountains, the deposit forming a ridge in the gully. This ridge is 185 feet long, from 10 to 25 feet wide, and 20 feet in height. The rock is pure white quartz, the mica crystals showing the whole length of the ridge on top, and in various places on the sides. Surface crystals were removed from every part of the ridge, in sizes varying from 4 x 6 to 7 x 10 inches. An opening was made eight feet in width and six feet in depth. The crystals taken from this opening measured from 4 x 6 to 15 x 24 inches."

Very few men are now at work at the Bristol mines and the company do not intend to add to their present stock pile, which is now in the vicinity of 20,000 tons, until the railroad is extended to the mines, a distance of from two and a half to three miles. This extension the company are pushing and expect to have made early in the season.

Owing to the deep snow and severely cold weather, work was suspended at the Stobie mine—the property of the Canada Copper Company—on 1st December, but operations will be resumed again in the spring.

At the Copper Cliff mine and vicinity about eighty men have been employed in sinking the shaft, which has now reached a depth of something over two hundred feet, driving levels, using a diamond drill, etc., underground, and cutting timber and wood outside. Little stopping has been done, and consequently no large quantity of ore has been raised to the surface, but the mine is being opened up ready for this work.

The twenty-two tons of ore taken from the Richardson Hill, Eldorado, by Mr. Mark Powell and others yielded a 20¼ ounce gold brick.

Satisfactory progress is being made at Mr. D. G. MacMartin's mica mine. From latest accounts the drift looks well, and shews large quantities of mica.

The Imperial Land and Mining Syndicate has been organised by parties who have been making explorations on the north shore of Lake Superior, a few miles east of Sault Ste. Marie, in an unsurveyed Indian reservation, and from a point near Port Arthur, east to Sault Ste. Marie. They have gained perfect titles to 1,100 acres of land which are said to contain rich mineral. A force of men are now at work carrying on development work. In their exploratory work they have located several iron mining properties and found deposits of copper ore.

At the Robertsville mine, on the Kingston & Pembroke Railway, very little has been done lately. Good work has, however, been done with the Diamond Drill, and prospecting has revealed several very promising beds of ore, one over 16 feet thick, of a very superior quality—on the property. Captain Kitto is taking out timber and making ample preparation for vigorous operations during the coming year.

There are thirty-six known iron deposits in North Hastings, from all of which ore can be obtained in large quantities, and any one of which will prove paying mines, if properly worked.

There are also numerous deposits of lead, antimony, plumbago or graphite, pyrites, etc., suited to chemical works, besides many other kindred minerals. All that is wanted in this section is capital to open up these mines.

Specimens of mineral taken from the property of Mr. Thomas Storey, at Escott, have been assayed at Ottawa, and found to contain traces of gold and silver.

In a local sheet published from the office of the *Advertiser*, Petrolia, the following figures regarding the oil industry are given:—Number of wells pumping oil, 3,860; approximate number of wells drilled in 1887, 400; number of hands employed in oil pumping, 3,000; employed in refineries, 500; average cost of well, \$400. The total amount of capital invested is estimated to be little short of \$3,000,000. During the last six months of 1887 the output of crude oil was about 500,000 barrels, the largest quantity ever shipped from Petrolia in the same length of time.

On lot 20 in the first concession of Snowdon, seven miles east of Kinmount, are found promising deposits of magnetic iron ore, yielding over 60 per cent of metallic iron with very little

impurity. A considerable quantity of ore has been mined on this lot by different parties. The lot is owned by Messrs. Thomas Shortiss and Henry O'Brien, of Toronto. Mr. Wm. Myles, who bought a portion of this property, built a branch railway $6\frac{1}{2}$ miles long in 1879, from the Victoria railway up to lot 20, and this is likely to form the first link in the Irondale, Bancroft and Ottawa railway, a company having been chartered to build a railway through this district. Messrs. Parry and Mills, of Chicago, have built a charcoal furnace on lot 19 in the first concession of Snowdon. They have also constructed, in connection with it, a good dam and saw-mill on the Burnt river, but after expending about \$40,000 operations have been suspended for want of funds.

Port Arthur District.

BEAVER MINE.—The last shipment of ore concentrates from this mine—including \$9,000 in bullion—makes over \$330,000 exported as reported by customs officers to date, a very handsome shewing considering that there are many thousands of tons of rich ore in the dump and in sight yet, as well as many barrels of concentrates at the mill, which is now undergoing some further improvements. The working force has been reduced of late; among other reasons given is that Mr. Peters has given an option for one half interest for \$1,500,000. The officers report that the mine never looked better, and that the force was reduced owing to the stoping ground not being sufficiently developed to keep the mill going steadily with a full force.

The Porcupine Mine still has a small force at work pending the sale, it is understood, to a strong New York company. This is a promising mine and having such good neighbors as the Beaver and Badger is bound to attract capitalists who will doubtless readily invest if the owners do not stand them off by exorbitant figures.

The Badger Mine is still creating a sensation by its rich ore. Everyone is anxious for Mr. Eschweiler to erect the mill for which preparation is being made. He claims to have at last settled on a treatment which will give better results than have ever yet resulted with the ore peculiar to this district.

MINING LOCATION R, 135.—The miners who have been at work at this property, which lies about three miles north of Silver Mountain, report that at a depth of forty-four feet native silver was struck. For a considerable distance previous, low grade ore containing sulphide of silver was encountered. One of the mine owners has gone out to make an examination, meanwhile a company is being formed to work this claim steadily. The value of this property is greatly enhanced by having a magnificent water power along side of the mine.

Some Chicago capitalists, represented in Port Arthur by Mr. P. M. French, are preparing to work some silver claims near that town when the snow goes down enough to permit teams to haul the supplies.

The BIG BEAR claim, a short distance north-east of the Rabbit Mountain mine, will also shortly go to work.

SILVER MOUNTAIN MINE, and its neighbour, the Crown Point Mine, keep on making steady progress. As no assayer lives on the premises,

it is impossible to ascertain the average value of the ore which is very fluctuating in richness. It is uncertain whether the work for a mill will be placed on the ground before the Government road is fully completed.

NATURAL GAS apparently exists both at Port Arthur and at the Kaministiquia River in spite of geological expectations to the contrary. Should it be found in volume it will be of great service in securing the smelting works so long required at Thunder Bay.

We are officially advised, says the *Engineering and Mining Journal*, that Messrs. Morrison & Macfarlane, brokers in mineral lands, Duluth, Minn., have recently bought from original owners 1,200 acres, known as the Cariboo vein, situated in Black Bay, east of Port Arthur. The property has been indifferently developed. There is indication of a rich silver lead deposit running through the location.

Manitoba and North-West Territories.

Mr. James Reilly writes to the *Calgary Tribune* suggesting that the Dominion Government contribute to the development of the mining industry, either by founding smelting works at central points, under control of Department of Interior, or by liberal cash subsidies and other facilities.

Gold miners, working on the Saskatchewan this season, made from \$3 to \$5 a day. The cold stopped them Nov. 12th.

The Cochrane coal seam, worked by Major Vaughan, is improving much. It is 75 feet from surface and is now about level.

Haney & Henderson have a good prospect near Edmonton, the vein being 12 inches and carries silver and gold, with some platinum and iron.

The Galt Co. has advanced the price of their coal from 25 to 50 cents a ton, which means a daily increase in their cash receipts of over one hundred dollars.

The coal vein, south side Saskatchewan, near Battleford, is being worked. It is three feet thick, light, hard and in large lumps. It is four feet above river level.

A meeting of the shareholders of the Medicine Hat Railway and Coal Company (Limited) will be held in Toronto on 31st inst.

Small quantities of coal have been taken out from the Souris district. The *Moosomin Courier* writes:—"We have given it a trial and it burns equal to the Galt, but not quite so free; there is no difficulty in keeping up a good fire with it, and it throws a good heat. The coal used was taken from a ravine bank and about 100 feet in. A branch railway to these mines would enable vendors to supply this excellent domestic fuel throughout Manitoba and the Territories for about \$3.50 per ton. Settlers would do well to consult their own interests and pay a visit to these coal fields."

A North-West member says that great activity now prevails at the new anthracite coal mine near Banff. A trial slope is being sunk and has reached 330 feet deep. The seam is seven feet six inches, and the quality of the coal is the very best anthracite. The mine is being worked night and day, and six tons an hour are

being taken out of the trial slope. As soon as the new machinery is in place the daily output will be large, probably four hundred tons. Although the weather in the month of February was unfavorable, yet considerable shipping was done. About 97 carloads left the mines, 31 of which went to Winnipeg and 63 to San Francisco and the Pacific coast. The outlook for trade to California is of the most promising character. The extent of the market can hardly be realized, and will tax the energies of the company during the coming season.

Many of the Victoria settlers use coal taken from the banks of the Saskatchewan; it is said to be equally as good as that found at Edmonton.

British Columbia.

Work has been resumed in the west slope of No. 5 Pit, Wellington Collieries. This will render it possible to increase the daily output to about five hundred tons, or just half the output of coal prior to the explosion.

The East Wellington Colliery (Chandler's) is now operated entirely by Chinese labor.

The *Nanaimo Free Press* says that the bore being put down by Mr. T. D. Jones on what is known as the West Estate of the V. C. Co. has struck an excellent seam of coal. This property is contiguous to the Wellington & East Wellington coal properties. Mr. Jones had in use his diamond drill, which brought up an inch and a quarter core.

It is understood that the owners of the Cayoose Creek quartz claim have effected a sale of their property on a very satisfactory basis.

A bill was passed on the 29th ult. giving foreign mining companies power to incorporate under the laws of the county or State in which the members of the company reside and work mines in British Columbia, by registering there. These concessions are for the purpose of attracting foreign capital for developing resources in the precious minerals.

The Privy Council has granted British Columbia leave to appeal from the judgment of the Supreme Court of Canada in respect to the title to minerals in the railway belt of the province. Mr. Jeune, Q.C., in making the application informed their Lordships that the question was of the greatest importance. Attorney-General Webster, on behalf of the Dominion, admitted that he could not very strongly oppose the application, and the appeal will be heard at an early date.

"We understand," says the *Colonist*, "that it is the intention of Messrs. R. Dunsmuir & Sons to open up the Perseverance and Union coal mines in Comox, a stretch of land eight or ten miles in length. This will be worked from six or eight different points with shafts and slopes. Wharves will be built on Baynes Sound and a standard gauge railway constructed past the "Perseverance" to the "Union," a distance of about thirteen miles. The work will be commenced immediately and pushed so that coal will be shipped by next fall. As soon as the surveys are completed, which will take about fourteen days, railway work will be commenced and 600 or 700 men put on for construction purposes. Mr. Dunsmuir assured a reporter of this paper that he intends to open up the field so that the production will amount

to 2,000 tons per day at least. The opening up of these mines is of the greatest importance to every portion of Vancouver Island, and to the Pacific board, and the undertaking will involve the expenditure of a large amount of money."

What Natural Gas Has Done.—A review of the revolution which has taken place in Western Pennsylvania since the introduction of natural gas three years ago shows that the steel furnace capacity in twelve iron and steel mills has been increased 1,164 tons per day, or at the rate of 349,200 tons per year. In several mills the furnace capacity has been increased 200 per cent., and in one nearly 100 per cent. In 1884 the capacity of local mills making wrought iron pipe was 174,000 tons per annum, now it is 360,000 tons per annum, the greatest in the world. The production of one establishment in 1887 exceeded the total output of 1884. The product of the iron and steel wire mills from 85,000 tons per annum has increased to 103,000 tons. In the blast furnaces an increase of 245,000 tons has been obtained, while the coke field product is being enlarged 22 per cent. In the manufacture of railroad locomotives there has been an increase of 25 per cent. In the window glass trade an increase of 5,976,000 feet per annum has taken place. In the manufacture of plate glass the increase has been fully 100 per cent. The growth of the natural gas interest is among the most remarkable things of the age. There are engaged in the enterprise twenty-six companies, with a nominal investment of \$23,505,000, of which \$18,360,000 is invested in Pittsburg companies. Experts estimate the total displacement of coal by gas in Allegheny County alone at 20,000 tons daily, which is equivalent to 500,000,000 cubic feet of gas every twenty-four hours.

Emphatic Guarantees.

Which are Justified by an Extraordinary Public Experience.

TO THE PUBLIC:

Having branch houses and laboratories in seven different quarters and therefore having a world-wide experience, we, H. H. Warner & Co. justify ourselves in making the following statements:

OUR THEORY PROVED.

I.—For the past decade we have held that 39 per cent. of diseases originate in the kidneys which introduce uric acid into every organ, attacking and destroying first the organs which are weakest. We have also held that *if the kidneys are kept in perfect health most of the ordinary ailments will be prevented*, or, if contracted, cured. Other practitioners have held that extreme kidney disease was incurable. We have *proof to the contrary*, however, in hundreds of thousands of cases in every section of the globe. Warner's Safe Cure is the greatest specific known. Its reputation is established everywhere, and its influence surpasses all other medicines.

HOW DISEASE CREEPS ON.

II.—The kidneys being the sewers of the human system, it is impossible to keep the entire system in good working order *unless these organs are doing their full duty*. Most people do not believe their kidneys are out of order because they never give them any pain. *It is a peculiarity of kidney disease that it may long exist without the knowledge of the patient or of the practitioner*. It may be suspected if there is any gradual departure from ordinary health, which departure increases as age comes on, the kidney poison in the blood gradually undermining and destroying every organ.

SCIENTIFIC SPECIFICS.

III.—We do not cure every known disease from one bottle. This is *an impossibility*. Warner's Safe Remedies include seven scientific specifics, each one of which has a specific purpose which the others cannot fully perform.

RECOGNIZED STANDARDS.

IV.—Warner's Safe Remedies have been recognized by the doctors and the people all over the globe, even in countries most conservative and most opposed to the manufacture of proprietary medicines, *as standards of the highest excellence and worthy of the patronage of all people*.

STRONG GUARANTEES.

V.—We make the following unqualified guarantees:

Guarantee 1.—That Warner's Safe Remedies are *pure and harmless*.

Guarantee 2.—That the testimonials used by us are *genuine*, and so far as we know, absolutely *true*. We will forfeit \$5,000 for proof to the contrary.

Guarantee 3.—Warner's Safe Remedies have permanently cured many millions of people whom the doctors have pronounced incurable. People who were cured ten years ago report the cure *permanent and completely satisfactory*. Warner's Safe Remedies will sustain every claim, if used sufficiently and as directed.

VI.—Ask your friends and neighbors what they think of Warner's Safe Cure. We do not ask you to believe us alone.

YOUR FRIENDS AND NEIGHBORS.

MRS. JAMES BURNS of 18 Division St., Toronto, writes that her daughter was given up to die, by the best medical men in the city, from Bright's Disease of the Kidneys, but that Warner's Safe Cure not only saved her life but restored her to health.

L. A. BAKER, of Toronto, Supt. Fire Patrol Co. of Canada, suffered from lame back for three year. Physicians treated him for Bright's Disease, but he obtained no relief. Four bot-

tles of Warner's Safe Cure made a well man of him.

W. J. HAMILTON, of Amherst, Nova Scotia, was cured of hemorrhage of the kidneys after doctors failed to cure him and the last dying rites of the church had been given him.

MRS. HAYWARD, of 321 Church St., Toronto, was cured of Chronic Dyspepsia with six bottles of Warner's Safe Cure.

JOHN GIVES, of Galt, is a living monument to the power of Warner's Safe Cure over Enlargement of the Liver.

We could give thousands of similar testimonials. Warner's Safe Cure does exactly as represented.

VII.—We were forced into the manufacture of Warner's Safe Remedies in obedience to a vow made by Mr. H. H. Warner that he would, if the remedy now known as Warner's Safe Cure restored him to health, spread its merits before the entire world. In ten years the demand has grown so that laboratories have been established in seven quarters of the Globe. Not only is Warner's Safe Cure a scientific specific—it *cures when all the doctors fail*, thousands of the best of physicians prescribe it regularly, its power over disease is *permanent* and its reputation is of the most exalted character.

(a) Paper read before the Canadian Institute, Toronto.

(a₂) Revised and corrected from "Clavos" in the Emigrant.

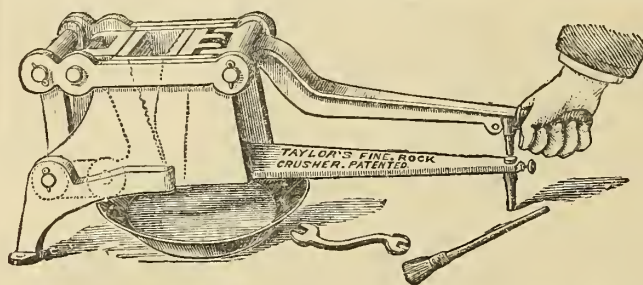
(b) From this term is derived the expression "checker house," applied to the shed covering the head-drums, in which the operation of "checking" is done.



AS the plans for the erection of the proposed Post Office at Prescott, Ont., are to be amended, intending tenderers are hereby notified that new tenders will be called for at a future date.

By order,
A. GOBEIL,
Secretary.

Department of Public Works,
Ottawa, 24th Feb., 1888.



Taylor's Laboratory Rock Crusher.

The Assayers and Chemists' Friend.

PRICE COMPLETE, . . . \$25.00

Manufactured and sold by

New York Metallurgical Works.

104 and 106 Washington St., New York.

E. N. RIOTTE, Manager.

PEERLESS OILS FOR MINERS' USE ARE UNEQUALLED.

"PEERLESS CYLINDER OILS!"

"610 CYLINDER OILS!"

"PEERLESS ENGINE OILS!"

WE! "ELDORADO ENGINE OILS!"

LEAD! "PEERLESS MACHINERY OIL!"

OTHERS! "PEERLESS SHAFT & BOX GREASE!"

FOLLOW US! "COTTON WASTE, ALL KINDS!"

TRY A SAMPLE! "SAFETY OIL TANKS!"

WILL SEND FREE! "MINERS LAMP OILS!"

TO ANY ADDRESS! "DRILL OILS!"

Teephone or Write

THE SAMUEL ROGERS OIL CO'Y,

RUSSELL BLOCK, OTTAWA,

N.B.—"Sole Manufacturers of the above brands."

FOR SALE. Asbestos Mines.

On Lots 27, 28 and 29, in Range A, of Colrairie, Megantic County, P. Q.

300 ACRES,

One Mile from Quebec Central Railway.

Free from Reserves or Royalties.

James Reed,
Reeddale, Megantic, P. Q.

CHEMICAL LABORATORY

OF THE UNIVERSITY COLLEGE OF OTTAWA,

Under the direction of *PROF. C. F. MARSAN, M.A., Dominion Examiner of Public Analysts,*
and *A. L. TOURCHOT, Demonstrator of Applied Chemistry.*

THE MOST COMPLETE OUTFIT IN THE DOMINION FOR ALL KINDS OF ANALYSES.

A SPECIAL DEPARTMENT

Has been just completed for the Analysis of Phosphate, and will be found to answer most satisfactorily the wants of the Phosphate industry.

Rock Drills, Air Compressors,

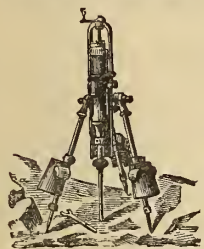
General Mining Machinery,

Wire Rope and Contractors' Supplies.

FOR CATALOGUES, ESTIMATES, &c., ADDRESS:

INGERSOLL ROCK DRILL COMPANY,
(LIMITED.)

44 Foundling Street, Montreal.



Department of Inland Revenue.

An Act Respecting Agricultural Fertilizers.

The public is hereby notified that the provisions of the Act respecting AGRICULTURAL FERTILIZERS came into force on the 1st of January, 1886 and that all Fertilizers sold thereafter require to be sold subject to the conditions and restrictions therein contained—the main features of which are as follows:

The expression "fertilizer" means and includes all fertilizers which are sold at more than TEN DOLLARS per ton, and which contains ammonia, or its equivalent of nitrogen, or phosphoric acid.

Every manufacturer or importer of fertilizers for sale, shall, in the course of the month of January in each year, and before offering the same fertilizer for sale, transmit to the Minister of Inland Revenue, carriage paid, a sealed glass jar, containing at least two pounds of the fertilizer manufactured or imported by him, with the certificate of analysis of the same, together with an affidavit setting forth that each jar contains a fair average sample of the fertilizer manufactured or imported by him; and such sample shall be preserved by the Minister of Inland Revenue for the purpose of comparison with any sample of fertilizer which is obtained in the course of the twelve months then next ensuing from such manufacturer or importer, or collected under the provisions of the Adulteration Act, or is transmitted to the chief analyst for analysis.

If the fertilizer is put up in packages, every such package intended for sale or distribution within Canada shall have the manufacturer's certificate of analysis placed upon or securely attached to each package by the manufacturer; if the fertilizer is in bags, it shall be distinctly stamped or printed upon each bag; if it is in barrels, it shall be either branded, stamped or printed upon the head of each barrel or distinctly printed upon good paper and securely pasted upon the

head of each barrel, or upon a tag securely attached to the head of each barrel; if it is in bulk, the manufacturer's certificate shall be produced and a copy given to each purchaser.

No fertilizer shall be sold or offered or exposed for sale unless a certificate of analysis and sample of the same shall have been transmitted to the Minister of Inland Revenue and the provisions of the foregoing sub-section have been complied with.

Every person who sells or offers or exposes for sale any fertilizer, in respect of which the provisions of this Act have not been complied with—or who permits a certificate of analysis to be attached to any package, bag or barrel of such fertilizer, or to be produced to the inspectors to accompany the bill of inspection of such inspector, stating that the fertilizer contains a larger percentage of the constituents mentioned in sub-section No. 11 of the Act than is contained therein—or who sells, offers or exposes for sale any fertilizer purporting to have been inspected, and which does not contain the percentage of constituents mentioned in the next preceding section—or who sells or offers or exposes for sale any fertilizer which does not contain the percentage of constituents mentioned in the manufacturer's certificate accompanying the same, shall be liable in each case to a penalty not exceeding fifty dollars for the first offence, and for each subsequent offence to a penalty not exceeding one hundred dollars. Provided always that deficiency of one per centum of the ammonia, or its equivalent of nitrogen, or of the phosphoric acid, claimed to be contained, shall not be considered as evidence of fraudulent intent.

The Act passed in the forty-seventh year of Her Majesty's reign, chaptered thirty-seven and entitled, "An Act to prevent fraud in the manufacture and sale of agricultural fertilizers," is by this Act repealed, except in regard to any offence committed against it or any prosecution or other act commenced and not concluded or completed, and any payment of money due in respect of any provision thereof.

A copy of the Act may be obtained upon application to the Department of Inland Revenue, as well as a copy of a Bulletin which it is proposed to issue in April, 1888, concerning the fertilizers

E. MIALL,
Commissioner.

15th Dec, 1887.



SEALED TENDERS addressed to the undersigned and endorsed "Tender for Hot Water Heating Apparatus, Experimental Farm, Ottawa," will be received at this office until Monday, 19th March, for the several works required in the erection of Hot Water Heating Apparatus for five residences at the Central Experimental Farm, Ottawa.

Specifications can be seen at the Department of Public Works, Ottawa, on and after Friday, 9th March, and tenders will not be considered unless made on the form supplied and signed with actual signatures of tenderers.

An accepted bank cheque, payable to the order of the Minister of Public Works, equal to five per cent. of amount of tender, must accompany each tender. This cheque will be forfeited if the party declines the contract, or fail to complete the work contracted for, and will be returned in case of non-acceptance of tender.

The Department does not bind itself to accept the lowest or any tender.

By order,
A. GOBEIL,
Secretary.

Department of Public Works,
Ottawa, 9th March, 1888.



EXTENSION OF TIME.

THE time for receiving tenders for Iron Staircases for New Departmental Buildings,

OTTAWA,

is hereby extended to THURSDAY, 5th April.

By order,
A. GOBEIL,
Secretary.

Department of Public Works,
Ottawa, 12th March, 1888.



SEALED TENDERS marked "For Mounted Police Clothing Supplies," and addressed to the Honourable the President of the Privy Council Ottawa, will be received up to noon on Monday, 16th April, 1888.

Printed forms of tender, containing full information as to the articles and quantities required, may be had on application to the undersigned. No tender will be received unless made on such printed forms. Patterns of articles may be seen at the office of the undersigned.

Each tender must be accompanied by an accepted Canadian bank cheque for an amount equal to ten per cent. of the total value of the articles tendered for, which will be forfeited if the party declines to enter into a contract when called upon to do so, or if he fails to complete the work contracted for. If the tender be not accepted the cheque will be returned.

No payment will be made to newspapers inserting this advertisement without authority having been first obtained.

FRED. WHITE,
Comptroller, N. W. M. Police.
Ottawa, March 12th, 1888.

SUBSCRIBE NOW FOR

THE
Canadian Mining Review
1888.



INDIAN LANDS

LANDS IN THE UNDERMENTIONED localities are offered for sale to actual settlers through the following Indian Agents: On the Great Manitoulin Island, Lake Huron, Ontario; Mr. J. G. Phipps, of Manitowaning, is the Agent for the sale of lands in the following Townships on this Island: Assignack, Bidwell, Howland, Shequandah, Billings, Campbell, Carnarvon, Allan, Tehkummah and Sandfield, and in the Townships of Shequandah, Manitowaning and Shaftsbury (commonly called Little Current). Mr. B. W. Ross of Cockburn Island, is the Agent for the sale of lands on that Island and in the Townships of Gordon, Mills, Burpee and Barrie Island, and in the Township of Gore Bay as well as for those in the Townships of Robinson and Dawson, on Manitoulin Island. Leading roads have been constructed throughout the Great Manitoulin Island.

On the Saugeen Peninsula, Ontario, the lands in the Townships Amabel, Allenby, Keppel, Eastnor, Lindsay and St. Edmunds; as well as several Townships in the Peninsula, are offered for sale through Mr. William Simpson, Indian Lands Agent at Wiarton, County of Bruce, Ontario.

On the Garden River Reserve, Ontario, Mr. William Van Abbott, of Sault Ste. Marie, is the Agent for the sale of lands within this tract, and which are situated in the Townships of Macdonald, Laird and Meredith; also for lands within the tract commonly known as the Batchewana Bay Indian Reserve, and comprised in the Townships of Aweres, Fenwick, Kars, Pennethat, Dennis, Herrick, Fisher, Tilley, VanKoughnet, Tupper and Archibald. There is a leading road through these lands which affords ready communication with other parts of the country to intending settlers.

The condition of sale in respect to the lands within the Townships above described can be ascertained on application to the respective Agents.

(Signed) L. VANKOUGHNET

Deputy Supt. General of
Indian Affairs.

Department of Indian Affairs,
Ottawa, February, 1887.



NOTICE.

SALE OF COAL LANDS.

PUBLIC NOTICE is hereby given that Section 29, Township 24, Range 10, west of the 5th principal meridian, which is situated in the anthracite coal district, will be offered for sale at public auction at the Dominion Lands Office, Calgary, on Thursday, the 22nd day of March next, at the upset price of \$20 per acre.

The above land will be put up in two blocks, one being that portion to the north and east of the Bow River, and the other that to the south and west of it.

The terms of sale shall be one-fifth in cash at the time of sale and the balance in four equal annual instalments, with interest at the rate of 6 per cent. per annum.

The sale of this land will be subject to the regulations respecting Coal Lands. Payments must be in cash; scrip or warrants will not be accepted.

A. M. BURGESS,

Dep. of the Minister of the Interior.

Dept. of the Interior,
Ottawa, Feb. 28th, 1888.

NOTE.—No unauthorized insertion of this advertisement will be paid for.

VALUABLE PLUMBAGO AND OTHER Mineral Lands FOR SALE,

IN THE TOWNSHIP OF BUCK-
INGHAM, COUNTY OF
OTTAWA.

1st.—Lot 28, in the 6th range, containing 100 acres, in addition to the salina of the lake.

2nd.—North half of lot 23, in the 5th range, containing 100 acres.

3rd.—Nine acres of lot No. 28, in the 5th range, with water privileges thereto appertaining, being site of mill dam, etc., etc.

The property formerly belonged to the Montreal Plumbago Mining Company, and was worked successfully for several years, until the company's mill was destroyed by fire, but the mill dam remains almost uninjured, and there are on the property several houses, sheds, etc., built for various purposes when mining operations were carried out.

The Plumbago Deposits

upon the property are regarded as amongst the richest and most extensive in the Dominion. As to the quality of the Plumbago, it has been extensively used in the manufacture of crucibles, lubricating leads, stove polish, etc., etc., and given unbounded satisfaction. This is established by the experience of consumers, and by a certificate from the celebrated Battersea Crucible Works, London, England, a copy of which is open for inspection.

MICA

has also been discovered in quantities.

The lands are in the Phosphate region, and recent prospecting has disclosed a rich and extensive deposit of this mineral. There are unrivalled facilities for transporting the ore to and from the mines by the Ottawa River and C. P. Railway. Distance from mines to Railway Station 6 miles. Good road.

All that is required to make these valuable mines handsomely remunerative is a little capital and enterprise.

The Title is Indisputable.

For information apply to

WM. H. DICKSON,
160 Waller St., Ottawa

H. E. DICKSON,
Russell House, Ottawa.

OR TO THE OFFICE OF

THE CANADIAN MINING REVIEW,
OTTAWA.

FOR SALE. VALUABLE Copper Mining Properties

— IN THE —

Eastern Townships

TOWNSHIP OF ASCOT.

- 1st. Clark Mine, Lot 11, R. 7 Ascot 187 acres
- 2nd. Sherbrooke Mine, part Lots 12 and 13,
R. 7 Township of Ascot..... 329 "
- 3rd. Belvidere Mine, part Lots 9 and 10, R.
9 and 10, R. 8 Ascot 292 "
- 4th. Mining Rights in same vicinity on..... 250 "

All of the above properties lie within $1\frac{1}{2}$ miles of the Village of Lennoxville, at the junction of the Grand Trunk, Canadian Pacific and Passumpsic Railways, and have been developed to a considerable extent, and veins opened 6 to 20 feet in width, yielding 3 to 5 per cent. of copper, also silver, and 35 to 40 per cent. of sulphur. These mines are only $2\frac{1}{2}$ to 3 miles distant from the City of Sherbrooke, and evidently are of the same class of ores found at Copelton, only four miles distant, owned and worked by the Orford Copper and Sulphur Company, and by Messrs. G. H. Nichols & Co., of New York, which have proved so remunerative.

TOWNSHIP OF ORFORD.

- 5th. Carbuncle Hill Mine, Lots 2 and 3 R. 14, and
2, 3, 4 R. 15, 718 acres. Same class of ore as is found in the Ascot properties above described, but yielding a higher percentage of copper.

TOWNSHIP OF CLEVELAND.

- 6th. St. Francis Mine, $\frac{1}{4}$ Lot 25 R. 12, 50 acres, with dwelling houses, smith's shop, ore sheds and office, large winding and pumping steam engine, with boiler, winding and pumping gear, and about forty fathoms Cornish lifting pumps complete, railway tracks, ladders, etc., situated three miles from Grand Trunk Railway. A considerable amount of mining work has been done at this mine. A well defined vein richly charged with vitreous purple and yellow sulphurets of copper traverse the entire length of the property, five feet in thickness, yielding 8 to 40 per cent. metallic copper.

TOWNSHIP OF GARTHBY.

- 7th. Fifty-six lots of land, 2,938 acres. This property for the most part is unexplored, but copper is found on the greater part of the property. On one of the lots a vein about twenty feet in width has been found. Samples of the ore have yielded as much as 22 per cent. of copper, being also rich in sulphur. Other samples of pyrites from the same property, free from copper, have yielded as high as 48 per cent. of sulphur. The only drawback to this property is in its distance from the railway, it being about four miles from Garthby Station, Quebec Central Railway. A new line is chartered, however, which, when built, will run directly through the property.

TOWNSHIP OF ACTON.

- 8th. The Acton Mine, 100 acres, with engine, boiler, pumps and appliances. Within three years after this mine was first opened it produced nearly \$500,000 worth of copper. It is situated about half a mile distant from the stations of the Grand Trunk and South Eastern Railways.

- 9th. Brome Mine, part Lots 2 and 3 R. 4, 50 acres.
- 10th. Bolton Mine, two miles from Eastman Station, Waterloo & Magog Railway, 400 acres.

The above properties formerly belonged to the Canadian Copper and Sulphur Company, and were acquired by the present owner at sheriff's sale, giving an indisputable title thereto.

The whole or any portion of the property will be sold at reasonable prices.

For further information apply to

WM. FARWELL,
SHERBROOKE, P.Q.,
CANADA

RUSSELL & CO. PROVINCIAL AND DOMINION LAND SURVEYORS, CIVIL AND MINING ENGINEERS, PORT ARTHUR, ONTARIO.

Mining Properties Surveyed, Reported on and Dealt in.

Latest and Most Complete Plans of Thunder Bay
Mining District Always on Hand.

A. L. RUSSELL, A. H. MACDOUGLL, W. W. RUSSELL.
P. L. S., D. L. S. P. L. S., D. L. S. M.E.A.MCAN.SOC.C.E.

The Canadian Anthracite Coal Co. LIMITED. Miners & Shippers of Coal.

McLEOD STEWART, Prest., J. G. THORP, Vice-Prest.
OTTAWA, CANADA. EAU CLAIRE, WIS.
A. PUGH, General Manager, W. B. SCARTH, Secretary,
ST. PAUL, MINN. WINNIPEG, MAN.
O. H. INGRAM, Treasurer,
EAU CLAIRE, WIS.

Mines at Anthracite,
N. W. T., CANADA. v-1-1y

T. D. LEDYARD, DEALER IN MINERAL LANDS 4 ONTARIO CHAMBERS, TORONTO.

Will buy undeveloped iron ore and other mineral properties.

WANTED. — Deposits of Magnetic Iron Ore, Red Hematite, Brown Hematite, Galena, Iron and Copper Pyrites, Mica, Soapstone, Marble, Gypsum, Baryta. Samples can be sent by Sample Post for 1 cent for 4 oz. or up to 24 oz. in weight.

Information regarding mines cheerfully given. Correspondence solicited. Crown Land Business attended to.

WOLFF & COTTON,
Provincial Land Surveyors,
ONTARIO AND QUEBEC.
OFFICE:—52 ELGIN STREET, OTTAWA.
(Opposite Russell House.)

WM. HAMILTON MERRITT, F.G.S.

Associate Royal School of Mines, &c.,

Mining Engineer and Metallurgist,

Will report on Mines and Mineral Properties.

ADDRESS:

15 TORONTO ST., TORONTO, ONT.

JAMES HOPE & CO.. BOOKSELLERS,

Stationers, Bookbinders and Printers,
OTTAWA.

J. HERBERT & SON, 401 and 403--Wellington Street--599 OTTAWA.

Plain and Ornamental Slating, Felt and
Gravel Roofing, &c.

ESTIMATES GIVEN.

Orders Executed with Care under Personal
Superintendence.



Mining Regulations

TO GOVERN THE DISPOSAL OF

Mineral Lands other than Coal Lands, 1886.

THESE REGULATIONS shall be applicable to all Dominion Lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, iron or other mineral deposits of economic value, with the exception of coal.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein, either by surface or subterranean prospecting for mineral deposits, with a view to obtaining under the Regulations a mining location for the same but no mining location or mining claim shall be granted until the discovery of the vein, lode or deposit of mineral or metal within the limits of the location or claim.

QUARTZ MINING.

A location for mining, except for iron on veins, lodes or ledges of quartz or other rock in place shall not exceed forty acres in area. Its length shall not be more than three times its breadth and its surface boundary shall be four straight lines, the opposite sides of which shall be parallel, except where prior locations would prevent, in which case it may be of such a shape as may be approved of by the Superintendent of Mining.

Any person having discovered a mineral deposit may obtain a mining location therefor, in the manner set forth in the Regulations which provides for the character of the survey and the marks necessary to designate the location on the ground.

When the location has been marked conformably to the requirements of the Regulations, the claimant shall within sixty days thereafter, file with the local agent in the Dominion Land Office for the district in which the location is situated, a declaration or oath setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as aforesaid; and shall, along with such declaration, pay to the said agent an entry fee of FIVE DOLLARS. The agent's receipt for such fee will be the claimant's authority to enter into possession of the location applied for.

At any time before the expiration of FIVE years from the date of his obtaining the agent's receipt it shall be open to the claimant to purchase the location on filing with the local agent proof that he has expended not less than FIVE HUNDRED DOLLARS in actual mining operations on the same; but the claimant is required, before the expiration of each of the five years, to prove that he has performed not less than ONE HUNDRED DOLLARS' worth of labor during the year in the actual development of his claim, and at the same time obtain a renewal of his location receipt, for which he is required to pay a fee of FIVE DOLLARS.

The price to be paid for a mining location shall be at the rate of FIVE DOLLARS PER ACRE, cash, and the sum of FIFTY DOLLARS extra for the survey of the same.

No more than one mining location shall be granted to any individual claimant upon the same lode or vein.

IRON.

The Minister of the Interior may grant a location for the mining of iron, not exceeding 160 acres in area which shall be bounded by north and south and east and west lines astronomically, and its breadth shall equal its length. Provided that should any person making an application purporting to be for the purpose of

mining iron thus obtain, whether in good faith or fraudulently, possession of a valuable mineral deposit other than iron, his right in such deposit shall be restricted to the area proscribed by the Regulations for other minerals, and the rest of the location shall revert to the Crown for such disposition as the Minister may direct.

The regulations also provide for the manner in which land may be acquired for milling purposes reduction works or other works incidental to mining operations.

Locations taken up prior to this date may, until the 1st of August, 1886, be re-marked and re-entered in conformity with the Regulations without payment of new fees in cases where no existing interests would thereby be prejudicially affected.

PLACER MINING.

The Regulations laid down in respect to quartz mining shall be applicable to placer mining as far as they relate to entries, entry fees, assignments, marking of localities, agents' receipts, and generally where they can be applied.

The nature and size of placer mining claims are provided for in the Regulations, including bar, dry, bench creek or hill diggings, and the RIGHTS AND DUTIES OF MINERS are fully set forth.

The Regulations apply also to

BED-ROCK FLUMES, DRAINAGE OF MINES AND DITCHES.

The GENERAL PROVISIONS of the Regulations include the interpretation of expressions used therein; how disputes shall be heard and adjudicated upon; under what circumstances miners shall be entitled to absent themselves from their locations or diggings, etc., etc.

THE SCHEDULE OF MINING REGULATIONS

Contains the forms to be observed in the drawing up of all documents such as:— "Application and affidavit of discoverer of quartz mine." "Receipt for fee paid by applicant for mining location." "Receipt for fee on extension of time for purchase of a mining location." "Patent of a mining location." "Certificate of the assignment of a mining location." "Application for grant for placer mining and affidavit of applicant." "Grant for placer mining." "Certificate of the assignment of a placer mining claim." "Grant to a bed rock flume company." "Grant for drainage." "Grant of right to divert water and construct ditches."

Since the publication, in 1884, of the Mining Regulations to govern the disposal of Dominion Mineral Lands the same have been carefully and thoroughly revised with a view to ensure ample protection to the public interests, and at the same time to encourage the prospector and miner in order that the mineral resources may be made valuable by development.

COPIES OF THE REGULATIONS MAY BE OBTAINED UPON APPLICATION TO THE DEPARTMENT OF THE INTERIOR

A. M. BURGESS,

Deputy Minister of the Interior.

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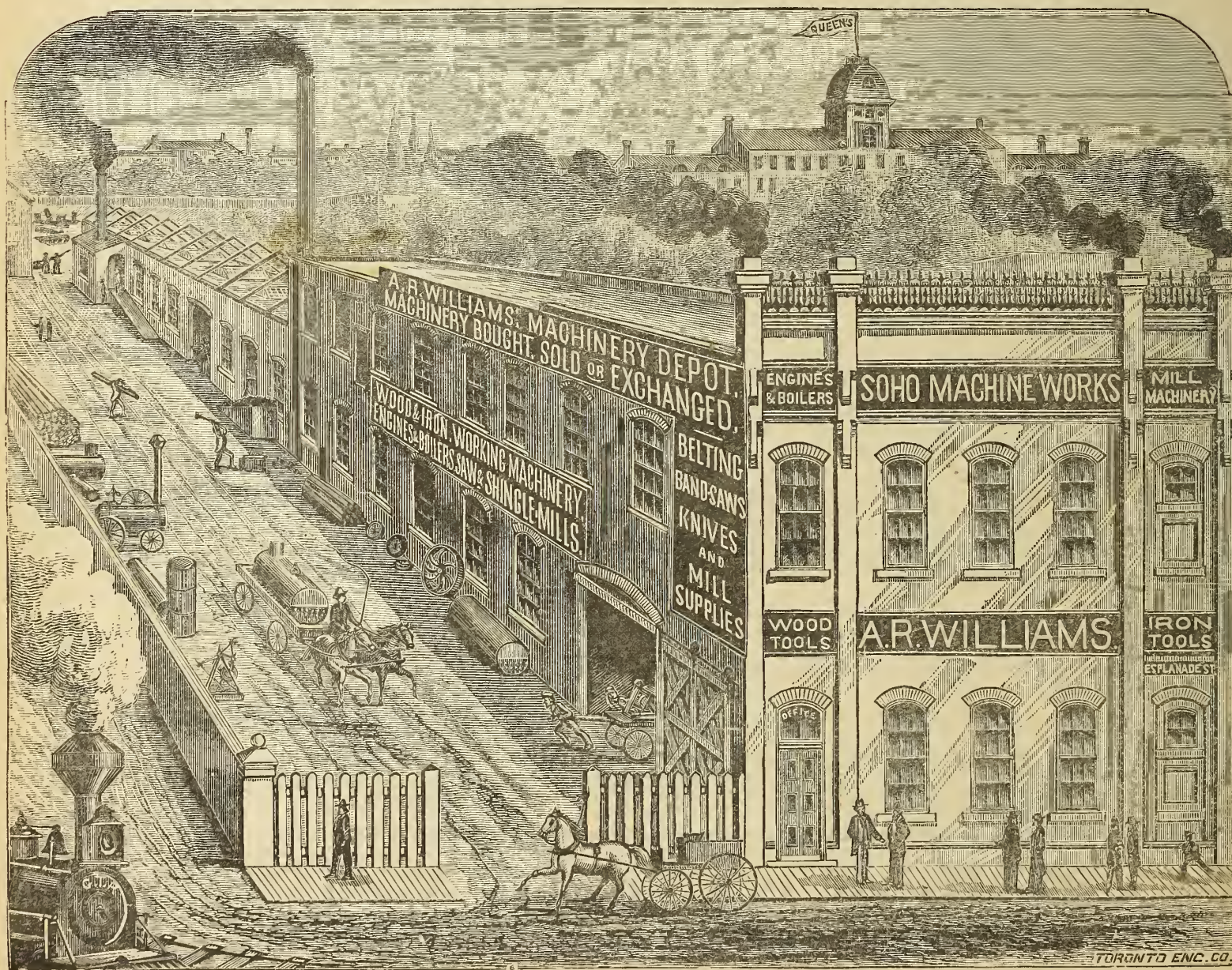
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THE Canadian Mining Review

Established 1882.



Vol. VI.—No. 4.

1888.—OTTAWA, APRIL—1888.

Vol. VI.—No. 4.

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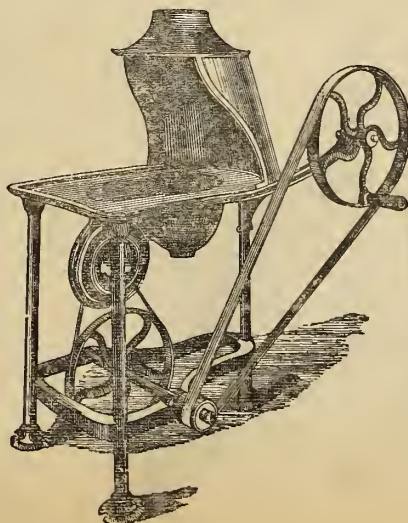
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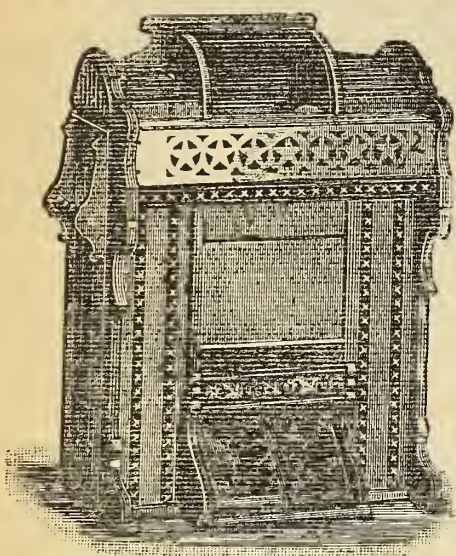
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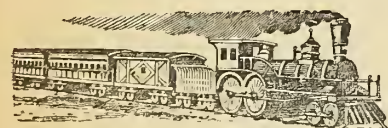
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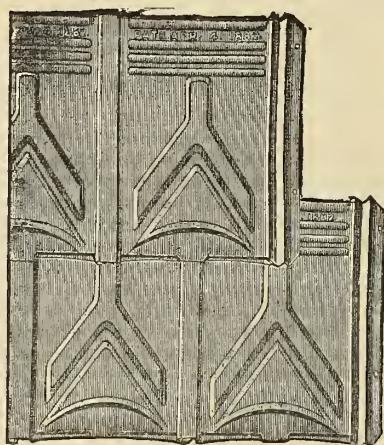
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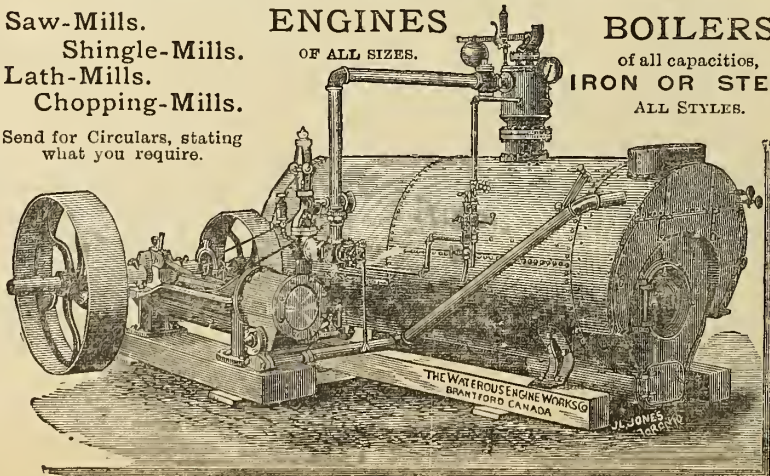
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readily understand the difficulty of obtaining accurate returns from far distant mining towns early in the year, but enough information can be gathered respecting the minerals most in demand to approximately approach a fair result. As our mining industries are annually more and more developed and fresh products find their way into the markets, so the list will continue to increase, a fact remarkably apparent in this new issue of the summary already. Mr. Coste is doing a good work in acquainting the public with facts, and the thanks not only of the mining community but of commercial men generally are due to him for the labor evinced and the evident pains taken to tabulate in so summarized a form such a mass of information. Only those who undertake such work realise the labor in condensing copious information into a table occupying only a page. The figures presented are the pith of weeks of labor, and the more condensed such statements are the more valuable they become. The following is Mr. Coste's summary slightly abbreviated:—

NAME OF PRODUCT.	1887.	
	Quantity (a)	Value (b)
Antimony ore..... tons	434	\$18,960
Arsenic..... "	30	1,200
Asbestos..... "	4,573	227,716
Paryta..... "	400	2,000
Brick..... thousands	139,185	725,694
Building stone..... cu yds	223,835	450,934
Cement..... bbls	69,843	81,909
Charcoal..... bush	1,610,900	88,823
Chromic iron ore..... tons	38	570
Coal..... "	2,368,041	5,208,429
Coke..... "	32,198	86,214
Copper (c)..... lbs	3,260,424	342,345
Flagstone..... sq ft	110,925	10,811
Gold (d)..... ozs	62,289	1,111,877
Granite..... tons	15,123	98,995
Graphite..... "	300	2,400
Grindstone..... "	2,772	35,363
Gypsum..... "	154,008	157,277
Iron (e)..... "	31,527	1,087,728
Iron ore..... "	76,330	146,197
Lead (fine, contained in ore)..... lbs	204,800	9,216
Lime..... bush	2,303,667	389,369
Limestone for iron flux tons	17,171	17,500
Manganese ore (f)..... "	1,630	39,672
Marble and serpentine..... "	242	7,845
Mica..... lbs	22,083	29,816
Miscel. clay products..... "	.....	78,670
Ochre..... tons	100	1,500
Petroleum (g) (bbls of 35 imp gals)	594,411	463,641
Phosphate (h)..... tons	23,690	319,815
Pig iron..... "	24,827	366,192
Platinum..... ozs	1,400	5,600
Pyrites..... tons	38,043	171,194
Salt (i)..... "	66,175	166,394
Sand & gravel (exports)..... "	180,860	30,307
Silver (j)..... "	.....	322,602
Slate..... tons	7,357	89,000
Soapstone..... "	100	800
Steel (k)..... "	7,326	331,199
Sulphuric acid..... lbs	5,477,956	70,609
Superphosphate..... tons	493	25,943
Tiles..... thousands	8,555	136,112
Whiting..... bbls	500	600
Total.....		\$12,959,073

(a) Quantity marketed except when otherwise specified. The tons are of 2000 lbs.

(b) Market value less charges of transport from point of production.

Nova Scotia and British Columbia values have not been received but are estimated as above, except for grindstones.

(c) Quantity of fine copper manufactured from the ore of Capelton plus fine copper contents calculated from assay value in the other returns.

(d) Nova Scotia gold is estimated at \$19.50 an ounce and British Columbia gold at \$17 an ounce.

(e) This includes 6 rolling mills, 1 forge and also the Londonderry Iron Works. The returns from the 4 Montreal rolling mills and from another mill at St. John, N.B., have not been received, and, unfortunately, render this statement incomplete.

(f) The value of the Nova Scotia ore is estimated at only 25.00 per ton, as the returned quantity is thought to include a certain amount of low grade ore used in making paint.

(g) Crude equivalent of the quantity (7,905,666 imp. gallons) of refined oils inspected, calculated at 100 galls. crude for 38 galls. refined. The direct returns received from 13 refineries give the quantity of illuminating oils and benzine and naphtha manufactured during the year as:—10,732,395 imp. gallons, worth \$1,022,739 and the actual corresponding consumption of crude returned as:—763,933 barrels.

(h) Direct returns; the value is taken at an average of \$13.50 a ton at the mines. The production is divided as follows:—

From Ottawa County mines..... 18,955 tons
From Ontario mines..... 4,735 "

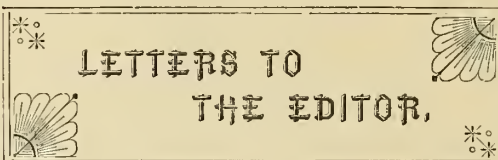
Total..... 23,690 "

which agrees very nearly with the Customs Department figure of export which is for the calendar year 1887:—23,152 tons with a declared value of \$433,217.

(i) In barrels of 280 lbs. it would be 429,807 brls. The value is that of the salt alone, exclusive of packages.

(j) Export returns plus \$116,318 estimated silver contained in the copper pyrites of the Capelton mines—together the total production is probably from six different mines.

(k) Return probably not quite complete.



We invite Correspondence upon matters consistent with the character of the REVIEW.

Be as brief as possible. The writers name in all cases required as a proof of good faith.

One dozen copies of the issue containing his communication will be mailed free to any correspondent on request.

We do not hold ourselves in any way responsible for the opinions expressed in this section of the REVIEW.

Some Ontario Iron Deposits.

Toronto, 12th April, 1888.

The Editor

THE CANADIAN MINING REVIEW:

SIR,—The Snowdon Iron District, Township of Snowdon, County of Haliburton, contains several valuable deposits of iron ore. About 7 miles east of Kinmount, the Monck Road crosses an ore bed on lot 20, 1st con., where the first discovery was made; the ore is magnetic, yielding by analysis over 60 per cent. metallic iron with small amounts of impurities. There appear to be considerable quantities of ore here, and the railway passing through the lot gives good facilities for mining.

Ore from this district can be shipped very cheaply, either to Pennsylvania furnaces by all rail route, via Buffalo, or to Midland, on the Georgian Bay, by rail, and thence by boat to Chicago, cheap freights being obtainable in returning grain vessels.

Chicago is an immense consumer of iron ore, the North Chicago Rolling Mills alone using 1,700 tons a day, so that if a trade were once opened up in that direction, it would be likely to swell to large proportions.

Lot 27, in the 4th concession, shows on the north-east corner an exposure of magnetic iron ore 16 x 2½ feet, and a magnetic attraction 25 x 40 feet. On the west side is a vein where the attraction is over a space 40 feet wide by 690 feet in length, with 7 or 8 exposures of ore, and 100 feet further south a strong attraction 30 x 30 feet, with an exposure of iron sand and ore. The outcrops are on a hill 200 feet above the track of the Irondale, Bancroft and Ottawa Railway, which is about 1,000 feet distant. The ore may be mined by drifting tunnels into the hillside, and the ore loaded on the railway cars by tram-cars, which could be run down by gravity. The Burnt River runs directly in front of this ore range and affords good drainage.

The ore is of Bessemer quality, very free from impurities, as shewn by the following analysis by the chemists of two Pittsburg steel works:

Metallic iron..... 62.57 63.00
Titanium..... None. None.
Sulphur..... None. 0.025
Silica..... 3.1
Phosphorus..... 0.025 Trace only.

An exposure of limestone occurs on this lot, and there is plenty of timber for mining purposes. On lot 25 are several good shows of magnetic ore, an analysis of which is as follows:

Metallic iron..... 62.00
Titanium..... None.
Sulphur..... 0.025
Silica..... 1.7
Phosphorus..... Trace.

Between these two properties, on lot 26, in the 4th concession, is the Howland Mine, operated by Mr. C. J. Pusey. A shaft has been sunk here 80 feet, and is said to be in good ore, of which the following is an analysis:

Metallic iron..... 61.48
Phosphorus..... 0.01
Titanium..... None.

Other shows of ore occur on lot 26. This ore range extends for about three-quarters of a mile across these lots, and, being so favourably situated on high ground close to the railway, possesses peculiar advantages. In close proximity to this magnetic iron range on lot 24, in the 3rd concession, Snowdon, are deposits of limonite or brown hematite. This ore, although not Bessemer quality, would be useful for a local furnace and for ordinary castings.

Close at hand is excellent water power on a creek which flows into the Burnt River, and on which there is a suitable site for a blast furnace; the position also being favourable for obtaining an abundant supply of cheap charcoal.

Belmont Mine.—The following are extracts from a report made by Prof. Thos. Heys, of Toronto, of a large bed of magnetic iron ore on lot 19, in 1st con., Belmont, Co. of Peterboro':

"This lot is about four miles nearly due north from the Village of Blairton, and there is a fairly good wagon road to the mine. There is a clearance of about 20 acres, the remainder being covered more or less with timber.

The ore deposit is situated near the east side of the west half, about midway between north and south on the lot, and has been cleared and underbrushed. On this is an exposure of magnetic iron ore, with the soil stripped to a depth of 4 to 5 feet. The excavation shows what appears to be a solid bed of ore, with a westerly dip of 20 degrees.

The ore is strongly magnetic, considerable portions showing a compact ore almost free from rock matter, and very free from sulphur.

Two other excavations were examined, one about 60 feet to the south and the other about 120 feet to the east; the ore in these was overlaid with surface soil to a depth of 2 or 3 feet. The character of the ore in these appeared to be the same as in the other exposure, some hematite of fair quality showing on the easterly side.

The extent of the ore-bed, as shown by the dip-needle, is more than two acres, measuring about 250 feet from east to west, by 390 feet from north to south. It is covered by surface soil to a depth of 4 to 5 feet (in some places, perhaps, more), which can be easily removed.

The ore-bed can be easily drained, as it lies close to a creek which would carry off the water.

The location is convenient for the shipment of ore, being about six miles from the Blairton station of the Canadian Pacific Railway, on two miles of which the rails are already laid, being a portion of "The Cobourg, Peterboro' and Marmora Railway," thus leaving only four miles to

be constructed, the line for which is most favourable, over a level route with no engineering difficulties. "The Central Ontario Railway" runs about six miles east of the mine, in which direction there is also a most favourable route for a branch railway.

The facilities for obtaining hardwood and charcoal from the surrounding country are especially favourable from the close proximity of Belmont Lake and its tributary waters, including Crow River, which flows through lots 14 and 15 of the same range, within a mile and a-half of the mine.

A fine site for a blast furnace is found on Crow River, close to the branch railway line, on there is also a powerful and never failing water power.

Abundance of limestone for flux is found on these waters.

Judging from the ore exposures, the dip of the ore and the magnetic attraction in connection therewith, I consider the deposit to be very extensive, and there is no doubt it contains a large quantity of first-class ore, with no trace of titanium and practically no phosphorus or sulphur, while the rock matter "would be to a considerable extent self-fluxing."

Prof. Heys computes that this ore-bed contains at least one million tons of ore within 100 feet of the surface, and there should be no difficulty in producing 300 or 400 tons of ore a day.

A report made of the same property by Mr. F. D. Taylor, M.E., who has had large mining experience, contains the following:

"From the action of the dip-needle and from the three cross-cuts which had been cleared out showing an unbroken body of magnetic ore of an unusual width, I feel assured upon development it will prove one of the finest and largest iron mines on this continent. Although very high in metallic iron, it is by no means a refractory ore, and will be found in its working in the blast furnace that it will reduce very easily and not require above the average charges of coke to the ton.

"In the opening and working of this mine, it can be made to yield profits from the commencement (as the stripping is so light), and should be mined by the use of compressed air drills at a cost of 50 cents per ton, as little or no culling will have to be resorted to.

"This is one of the very few mines that can be taken hold of and put on a paying basis at a small amount for dead work. The expenses required will be simply for equipment and general buildings."

An analysis of surface ore made by Prof. E. J. Chapman, of "The Toronto School of Science," gave metallic iron, 64.26; sulphur, 0.04; phosphorus, faint trace; titanium, none. The Professor remarking "This is an exceedingly good ore; not too dense in texture and rich in metal. It is well adapted for the Bessemer process."

An analysis of ore taken from about six feet below the surface, made by Mr. W. F. Druggan, Chemist of "The Scranton Steel Co.," showed metallic iron, 65.36; phosphorus, 0.002; sulphur, slight trace; silica, 4.5; the chemist remarking on the exceptional purity of the ore.

Since these analysis were made more of the ore-bed has been uncovered, and two pits sunk in different parts of the deposit. In November, 1887, samples of ore were taken from all over the deposit and an average analysis made by the Chemist of "The Joliet Steel Co.," which gave iron, 66.29; phosphorus, 0.024; silica, 3.19; manganese, .42; titanin acid, none.

An analysis made by Prof. Davenport Fisher, of Milwaukee, of ore taken about ten feet below the surface, gave iron, 68.88; silica, 3.18; phosphorus, 0.006; titanium, none.

These analysis show that the ore improves as it goes down, and that it is almost as perfect Bessemer ore as can be conceived.

On the construction of the branch railway into the mine, ore can be shipped conveniently to United States furnaces, either by all rail route in returning coal cars or by "The Central Ontario Railway" to the ore docks on Weller's Bay, and thence by boat to port, either on the south shore of Lake Erie or Lake Ontario.

If we had Unrestricted Reciprocity with the United States, Toronto would be an excellent point for a blast furnace, at which ore from this mine could be delivered for \$2 per ton, which would include mining and freight; or, if there was no duty, it could be delivered in Buffalo for \$3 per ton in returning coal cars, or in Pittsburg, Pa., for about \$4.50 per ton, and would probably be the cheapest Bessemer ore that could be obtained there.

I am, etc.,

T. D. LEDYARD.

Mineral Statistics.

OTTAWA, April 16th, 1888.

The Editor

THE CANADIAN MINING REVIEW:

DEAR SIR,—I was very surprised to see in your last number, page 31, a table by Mr. W. Hamilton Merritt pretending to represent the

mineral output of Canada in 1887. As this is not the first time that such tables have been published and circulated not only in Canada but in the United States and England, and as their complete incorrectness may have a very detrimental effect on certain mining industries and certain mining districts, I think it my duty to point out how unreliable these statistics are. In the following table of Mr. Hamilton Merritt, which you published in your last number, I have introduced the correct figures (according to official statements) on the second line for each product, so that a glance at the table might show at once that almost every figure in Mr. Merritt's table is wrong and that they are grossly so in several cases. To take only, for example, the case of the copper: it is certainly very injurious to the mines of the eastern townships to have it published, not only in Canada, but in the United States and in England, that they only produced in 1887 1,335 tons, when their real output was 38,772 tons. The same may be said of the phosphate mines of Ontario which have produced 4,735 tons instead of 733, as shown by Mr. Merritt; also of the mica mines antimony mines, &c.

I am, Sir, yours truly,

E. COSTE,

Mining Engineer to the Geological Survey, in charge Mining Statistics.

	Nova Scotia.	New Brunswick	Quebec.	Ontario.	Manitoba.	N. W. T.	British Columbia	Total.
Coal.....tons (a).....	1,524,000	700	.....	.....	0	61,000	413,370	1,938,060 tons.
.....	1,873,339	8,360	.....	.....	40	73,751	413,360	2,367,210
Gold.....\$.....	\$500,000	.....	0	.....	.....	0	\$793,709	1,193,709 dollars.
.....	\$413,614	.....	\$1,604	.....	.....	2,100	\$694,529	1,111,877
Gypsum.....tons.....	124,001	34,525	.....	5,450	.....	.....	.....	163,975 tons.
.....	116,345	29,102	.....	8,560	.....	.....	.....	154,003
Iron Ore.....tons.....	50,000	.....	0	18,907	.....	.....	4,410	73,347
.....	43,532	.....	13,404	16,598	.....	.....	2,796	76,330
Manganese Ore.....	520	1,066	.....	.....	.....	.....	.....	1,586
.....	306	939	.....	.....	.....	.....	.....	1,245
Copper.....	0	2	1,335	3,874	.....	.....	.....	5,267
.....	6	0	38,772	1,582(6)	.....	.....	.....	41,354
Silver.....\$.....	.....	.....	0	\$215,035	\$8,450	\$1,452	0	214,937 dollars.
.....	.....	.....	\$116,768	\$188,503	0	0	17,331	322,602
Salt.....tons.....	.....	0	.....	65,840	.....	.....	.....	65,840 tons.
.....	.....	13	.....	60,161	.....	.....	.....	60,173
Petroleum (crude).....bbls.....	.....	.....	.....	768,333	.....	.....	.....	768,333 bbls.
.....	.....	.....	.....	594,411	.....	.....	.....	594,411
Phosphate.....tons.....	.....	.....	21,000	733	.....	.....	.....	21,733 tons.
.....	.....	.....	18,955	4,735	.....	.....	.....	13,690
Asbestos.....	.....	.....	3,500	1,000	.....	.....	.....	4,500
.....	.....	.....	4,173	400	.....	.....	.....	4,573
Mica (c).....lbs.....	.....	.....	31,001	.....	.....	.....	.....	30,000 lbs.
.....	.....	.....	.....	.....	.....	.....	.....	22,083
Antimony Ore.....tons.....	174	0	.....	.....	.....	.....	.....	174 tons.
.....	550	34	.....	.....	.....	.....	.....	584
Pyrites.....	.....	.....	35,000	.....	.....	.....	.....	35,000
.....	.....	.....	38,743	.....	.....	.....	.....	38,043
Plumbago.....cwt.....	.....	7,180	.....	.....	.....	.....	.....	7,180 cwt.
.....	.....	6,000	.....	.....	.....	.....	.....	6,000
Barytes.....tons.....	0	.....	.....	3,000	.....	.....	.....	3,000 tons.
.....	400	.....	.....	0	.....	.....	.....	400

(a) On the second line for each product the tons are tons of 2,240 lbs.

(b) Export figure.

(c) We are only at liberty to give the total, but can say that there was much more produced in Ontario than in Quebec, and consequently that Mr. Merritt's figure is altogether wrong.

The Rock Formations of the Ottawa Valley and Natural Gas.

By Henry M. Ami, M.A., F.G.S.

In geology, as well as in other branches of physical research, it is often advisable and necessary to look back for a moment and consider the sum of evidence and facts which naturally accumulate in the work of investigation carried on in any particular district.

Much has already been published respecting the leading geological features of the Ottawa Valley. As far back as 1853 we find that Messrs. Richardson and Murray and other geologists, with Sir William Logan, carried on geological explorations in this district. The

results obtained by those pioneer geologists in Canada were embodied in the report entitled "Geology of Canada, 1863," and incorporated in the "Geological Map of Canada for 1866." This map gave the geographical distribution of the various geological formations in the Ottawa district, and the details of boundaries were laid down with such accuracy of detail as the facts at their disposal then allowed.

The eminent researches of Mr. E. Billings in strata about Ottawa are classic to every geologist and of incalculable value, especially with reference to the palaeontology or fossil evidence which they contain.

In the "Canadian Naturalist and Geologist," as well as in the "Decades of the Canadian Survey," Mr. Billings published many papers and described a series of crinoids and cystideans, which have been admired all the world over.

Investigations in the fossil *Eclmiodermata* of our rocks have been followed up successfully by his nephew, Mr. W. R. Billings, of our Club, and each year sees new and interesting results added to these researches.

Since the organization of the Ottawa Field Naturalist's Club, in 1879, renewed energy has been manifest in the completion of the geological history of this district, and a number of active workers have contributed not a little towards ascertaining the extent, distribution and other details respecting the various formations occurring about Ottawa.

In 1881, Dr. A. R. C. Selwyn, C.M.G., F.R.S., &c., the able Director of the Geological Survey of Canada, delivered a very timely and interesting address "On the Geology of the Ottawa Palæozoic Basin." (See Trans. O. F. N. C., Vol. III., p. 34, *et seq.*) There is there given a graphic, as well as instructive account of the various formations existing in the basin in question, which were deposited under such favourable circumstances in those old palæozoic seas.

During the past nine years, the writer has had many opportunities, both as member and leader in the geological section of the Club's work, to examine the geological formations of the district and enter into numerous details of structure, more interesting and instructive perhaps, than remunerative, nevertheless of considerable value in working out the geological history of Ottawa. With a view of giving in a concise and practical manner the result already obtained, it has been thought that a table or schedule might better illustrate the same than a detailed description.

The question of natural gas occurring or not occurring in the strata of the Ottawa district has been and is still being freely discussed—a

question of considerable import from an economic standpoint and one which has given rise to this paper, written with a view to giving those interested in the matter a general idea of the succession of the rock formations as they are known in this vicinity. There are many problems involved in discussing the likelihood of gas occurring in a certain district. The characters of the strata, its thickness, composition, mode of occurrence and its distribution have everything to do with the occurrence of gas. The result of experiments made in other parts of the world, and especially in the United States, show that gas occurs in rock of almost any age in the history of the earth, and in comparing the rocks of the Ottawa district with those of similar age and origin in the States which are known to afford natural gas, even there do we find questions of detail and structure coming in which prevent any one from making the rash statement that it does or does not occur here. For example, whilst it is well known that the Trenton formation in several places yields natural gas—nevertheless, it does so when the limestones of that rock-formation are dolomitic (Prof. Orton), which character we know does not apply to the Trenton as it is developed about Ottawa. It is also a remarkable fact that, besides the three great faults or dislocations indicated by Sir Wm. Logan ("Geology of Canada, 1863") to affect the geological structure of the rocks here, there are large numbers of smaller ones which constitute a more or less parallel series of breaks of great importance in working out the geological structure of the country, and which act as so many chimneys or openings whence natural gas may have been escaping for ages past, had the strata ever been impregnated with this substance. Whilst the

writer would be pleased to see natural gas occurring in large quantity and easy of access for manufacturing and other purposes, and whilst there are many points occurring in the geology of Ottawa which make it desirable that borings be made to ascertain if gas really does occur in paying quantities; nevertheless, the result of his researches lead him to conclude that there are undeniable evidences which point to the likelihood of gas not occurring in quantity about Ottawa. A bore sunk through the Hudson River, Utica and Trenton formations would soon reveal the fact of its occurrence, yes or no.

The following table has been prepared with a view of giving at a glance and in chronological order the different rock-formations met with. It does not by any means profess to be exactly accurate, but it has been drawn up from the evidence obtained in the field at the excursions and sub-excursions of this Club. These rock-formations divide themselves into three naturally grand divisions as they may be seen in the field, belonging to three different ages or epochs of the earth's history:

I. Laurentian or Archæan.

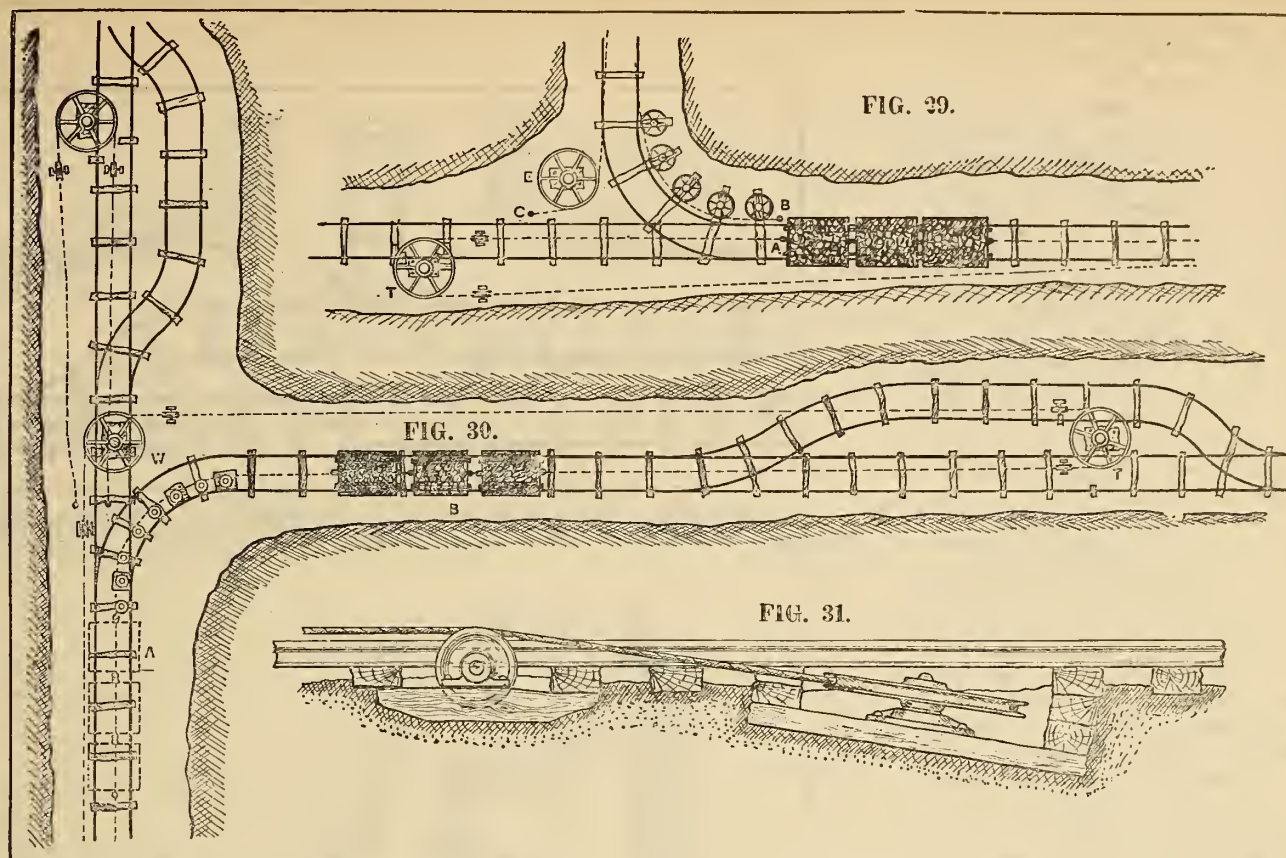
II. Cambro-Silurian or Ordovician.

III. Post-Tertiary or Post-Pliocene.

The local development of the second division, viz., Cambro-Silurian formations, include a series of formations which succeed in perfect unbroken sequence from the Hudson River formation above to the Potsdam sandstone below. For reasons, palæontological and stratigraphical, which it is not within the province of this paper here to discuss, the writer has placed the Potsdam and Calciferous formations along with the other overlying series into the Cambro-Silurian System, rather than class them in the Cambrian System.

TABLE shewing the Rock-Formations about Ottawa City, in their Natural Order.

SYSTEM.	FORMATION.	CHARACTER OF STRATA.	FOSSILS.	THICKNESS.
POST-TERTIARY	Alluvium, shell-marl, fresh water sands, lake and river gravels.	River and lake alluvium, sands and clays, shell-marl (white clays), ancient low beaches, stratified gravels.	Recent fresh water shells, plants and other organic forms. Pre-historic remains of Aborigines, along with <i>Castor fiber</i> , <i>Ariacus Virginianus</i> , <i>Limnæus galbana</i> .	Vary from 0 to 50 feet in different places.
	Saxicava Sand (marine)	Marine sands.	<i>Saxicava rugosa</i> , L. <i>Natica affinis</i> , Gmel. &c.	Vary from 0 to 6 feet and more.
	Leda clay (marine)	Chiefly stiff, blue clay, with occasional nodules, boulders and sandstone portions.	<i>Leda</i> (Portlandia) <i>arctica</i> , Gray. <i>Phoca groenlandica</i> and <i>Mallotus villosus</i> , insects, star fishes, &c.	Varies from 0 to 120 feet and more.
CAMBRO-SILURIAN or ORDOVICIAN.	Boulder clay	'Till,' 'moraine profonde,' glacial deposits.	No fossils yet discovered.	0 to 30 feet.
	Hudson River	Bluff-weathering calcareo-arenaceous shales and limestones.	<i>Zygospira Heali</i> , B. <i>Ambonychia radiata</i> , H. <i>Crytolites ornatus</i> , Con. <i>Modiolopsis pholadiformis</i> .	About 20 feet (known), probably thicker.
	Utica	Black or dark bituminous shales and limestones.	<i>Leptograptus flaccidus</i> , H. Orthogr. quadrinueronatus. <i>Triarthrus spinosus</i> , B. <i>Asaphus canadensis</i> , C., &c.	From 60 to 75 feet.
	Trenton	Nodular and evenly bedded for the most part light coloured limestones, with occasional shaly measures, in part bituminous.	<i>Prasopora Selwyni</i> , N. <i>Glyptocrinus ramulosus</i> , B. <i>Pleurocystites squamosus</i> , B. <i>Anazyga recurvirostra</i> , H. <i>Murchisonia bellicincta</i> , H. <i>Asaphus platycephalus</i> , S., &c., &c.	Between 400 and 500 feet.
	Bird's Eye and Black River.	Hard, compact, impure fossiliferous limestones (cement-rock).	<i>Tetradium fibiatum</i> , S. <i>Columnaria Halli</i> , N. <i>Maclurea Logani</i> , Salter. <i>Gonioceras anceps</i> , H. <i>Bathyrus extans</i> , H., &c., &c.	About 200 feet.
	Chazy	Limestones Shales Sandstones and sandy shales	<i>Lingula Belli</i> , B. <i>Orthis imperator</i> , B. <i>Asaphus canalis</i> , B., &c., &c.	20 } 30 } 200 feet. 150 }
	Calciferous	Magnesian limestones, quartziferous, passing downwards into arenaceous rock.	<i>Ophileta compacta</i> , S. <i>Murchisonia Anna</i> , B. <i>Lituites Apollo</i> , B. <i>Orthoceras Lamareki</i> , B.	250 to 400 feet.
	Potsdam	Sandstones and sandstone conglomerates.	<i>Ophileta compacta</i> , S. <i>Orthoceras</i> sp. <i>Scolithus Canadensis</i> , B. <i>Climactichnites</i> , &c., &c.	About 260 feet.
LAURENTIAN or ARCHÆAN.	Laurentian (Lower) of Logan	Granitoid gneisses, pegmatite, diorites, crystalline limestones (newer), &c., with apatite, graphite, iron ores, garnet, jasper, galena, barytes, gold, &c.	<i>Eozoon Canadense</i> . (Dawson.) (In limestones.)	16,500 feet, according to Logan.



Wire Rope Haulage and its Application to Mining.

By Frank C. Roberts, C.E., Philadelphia, Pa.

Continued from March Issue.

II. c. AERIAL PLANES (1)—It frequently occurs that the character of the route renders the construction of surface planes a matter of great difficulty and expense. To such cases the application of aerial planes has peculiar advantages. These planes consist of wire ropes extending between the points of desired communication. Upon these cables the carrying vehicles or carriages travel, the ropes serving as tracks. This system, as in the case of surface inclines, admits of single or double planes and may be operated by engine power or gravity, according to the conditions and requirements of the case.

Aerial inclines find frequent application in mountainous regions and in the hoisting of material from large open-cut mines or quarries. Fig. 24 shows a serviceable application of the single rope system. This system is especially adapted to quarry work where the loading point is continually shifting. As shown, the incline consists of a single wire rope, one end of which is made fast at the bottom of the quarry, while the other end passes through the head of a derrick or mast to an anchorage on the bank beyond. The hauling rope being fastened to one side of the carriage, passes downwards around the hoisting blocks and up again to the carriage, from whence it continues on to the hoisting engine. Attached to the main wire rope and immediately over the loading point in the quarry is located the stop block. (2) This block arrests the descent of the carriage beyond its position, but the hauling rope continuing to be paid out, the hoisting blocks are lowered into the quarry. Inclines of this character will readily hoist 150 to 200 tons per day.

Where the grades are excessively steep and large output is required, the double-rope system will be found very serviceable. The governing principles are similar to those of surface-inclines,

the two ropes serving instead of the surface track. Figs. 25 and 26 show this system as applied to the diamond mines of South Africa.

III. WIRE-ROPE HAULAGE.

Experience has clearly demonstrated that, where the output of a mine is sufficient to warrant the use of mules in hauling the product to the hoisting slope or shaft, the most economical method of underground transportation is obtained by the use of wire rope. So generally has this conclusion been accepted that, since its introduction a few years ago, the system has been extensively applied both at home and abroad. These remarks are especially true of the bituminous coal-regions of Pennsylvania, where there are but few mines of large output where one or another of the wire-rope systems is not in use.

Wire-rope haulage may be divided into three systems, viz: the tail-rope, the counter-rope, and the endless-rope systems.

III. a. THE TAIL-ROPE SYSTEM.—In this system the hauling-engine is located at a convenient point, generally the adit, and the *main* and *tail* ropes are attached to two rope-drums, seated on the engine shaft. The end of the main rope leading from the drum is attached to the forward end of a train of cars, while the tail rope, running along the side of the entry to the end of the line of tracks, passes around a sheave or wheel, so located that the rope is brought midway between the rails. The rope continuing between the rails is fastened to the rear of the train. In connection with each drum there is a friction clutch, by means of which one drum may be driven by the engine, while the other runs freely on the shaft. Thus, when a number of cars are drawn to the adit the *main* rope is wound on its drum while the *tail* rope is paid out. To take the empties back into the mine, the ropes are attached to each end of the train as above, the engine is reversed, and the tail-rope, now acting as the hauling rope, draws the cars back into the workings.

In application, this system naturally divides into two sub systems: 1st, that in which the

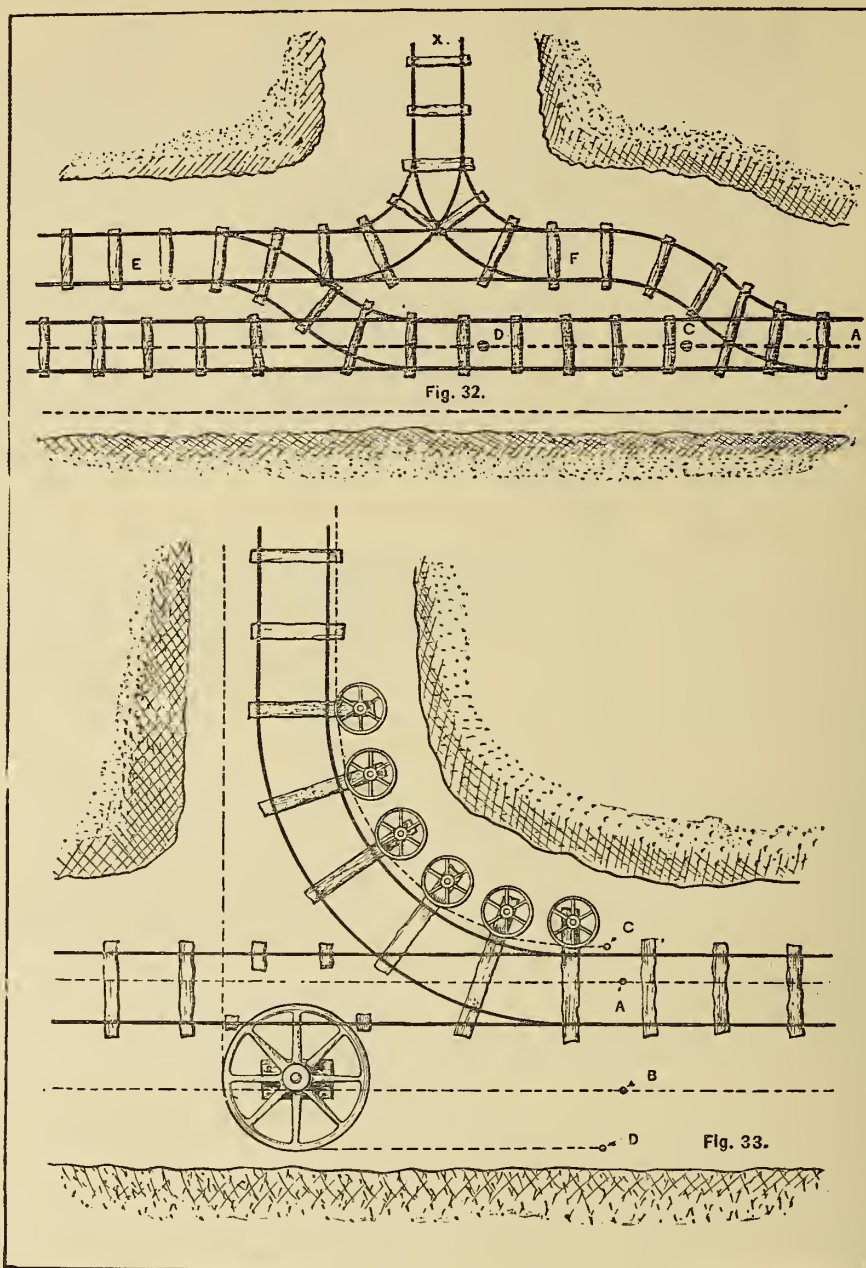
main entry only is operated by wire rope, the mining product being transported from the side-workings or entries to the haulage track by mules or gravity; and, 2d, that in which the side-entries also are operated by wire rope, the haulage-system in this case extending to all parts of the mine. One of the best systems of the former class is illustrated in Fig. 27, and is in use in one of the coal mines on the Monongahela River. The circumstances of location are such that it is necessary to place the engine and drums at a point intermediate between the two terminals, and not, as is usual, at one or the other end. This makes it necessary to employ two tail-sheaves, one at the parting A, and another at the parting B. The main rope is fastened to the drum M, and passing off is led around the tail-sheave at B, and attached to the forward end of the train at C. The tail-rope, on the other hand, is fastened to the drum T, and is led thence around the tail-sheave A and attached to the rear of the train. The main rope is supported between the rails by 6-inch rollers, about eighteen feet apart; and the tail rope is supported overhead along the sidewalls by rollers supported from the hanging-wall or roof of the pit. The rope is guided around curves by 12-inch wooden sheaves, arranged as shown in Fig. 18. At the sharp bends, guide-sheaves 4 feet in diameter are placed, and guard-rails are introduced at the sides of the track to prevent the derailing of the cars due to the angular pull of the rope at this point. The engine is double-acting, with 10-inch by 12-inch cylinders, and 4-foot diameter drums, geared 1 to 5½. The road is approximately 3,300 feet long, and its daily capacity is about 750 to 900 tons. The wire rope employed is steel, 7 wires to the strand: the main rope being 7/8 of an inch in diameter, and the tail-rope 5/8 of an inch. In this instance the coal is hauled by mules from the side-entries and branches to the general parting. When a sufficient number of cars have accumulated, the main rope is attached to the forward end of the train and the tail rope to the rear end, and the train is hauled to the tippie. This is the simplest form

of the tail-rope system, and were that system thus limited to the operation of one line, much less might be said in favor of it. To transport the mining product to the main entry with mules, and then transfer it to the rope system, is less economical in every way than to extend the operation of the rope-haulage system to the various workings. The additional first cost of a complete system is very slight, but the advantages gained in economy and convenience are multiplied. Each entry is here provided with its own separate rope passing around a tail-sheave at the end of the working, and supported in the usual manner by rollers. The rope is of such length that the two ends reach to the main entry, and, when not in use, rest on the ground. Again, the rope in the main entry is divided into as many sections as there are entries or branches, the connections being arranged at such distances that when the train is at the tippie one set of these connections is opposite each side-entry or branch. In this manner, when it is necessary to haul a set of cars into any particular one of the side entries, the connections of the rope in the main entry opposite the side-workings to be operated are detached, and the engine end of the main rope is attached to the extremities of the side rope which, as before mentioned, extends into the side working. When the connections have thus been made, we have what corresponds to the original continuous rope; but, in this case, the tail-sheave for the rope is located in the side-entry.

Figs. 29, 30 and 33 illustrate the usual methods of arranging the side-entry ropes. Fig. 33 shows the arrangements permitting the changing of the rope when the cars are at the adit. In this case, when it is desired to haul a set of cars into the side entry the main rope is detached at A and B, while the entry rope-ends C and D are connected to A and B, thus forming a continuous rope passing into the entry. Figs. 29 and 30 illustrate other arrangements, both of which are based upon changing the rope connection when the cars are near the side-entry, and not, as in the former case, at the terminus of the system. In Fig. 30, the guide-wheel W is placed under the main track, to permit the free passage of the rope, and the connections being severed, as before, one end of the entry-rope is attached to the train and the other to the main rope; and in this manner the side entry is operated as shown. The dotted lines at A show the position of the cars while the disconnection is made, B showing the train after passing into the entry. Fig. 29 shows an arrangement whereby but one disconnection is made in the main entry-rope, namely at A, the head of train. The end B of the entry-rope is here attached to the car and the end A of the main rope, being free, is drawn a little further by the engine and attached to the end C of the entry-rope. In both of these latter arrangements, where the road is not level, the disconnection is, of necessity, made while the rope is under a severe stress, thus rendering disconnection a difficult matter. This is not true of the method illustrated in Fig. 33, as the ropes are here disconnected while the cars are at the end of the system and the rope is consequently free from stress.

When operating a side-entry by either of the arrangements illustrated in Figs. 29 or 30 it is customary to facilitate disconnection by employing what are known as "knock-off" links. Figs. 34, 35 and 36 illustrate three devices that have given great satisfaction. Fig. 38 shows a shackle-joint, which is frequently used in making the connections between the sections of rope.

The usual method of locating the tail-sheave is illustrated in Fig. 31.



When it is found necessary to locate intermediate loading points in the main or side-entry between two terminals, the arrangement illustrated in Fig. 32 will be found convenient. Suppose a branch to a side entry at X and it is found necessary to have a switch station for loaded and empty cars at X. The empty cars coming from the direction A, the rope ends C and D are knocked off at these points, and the empties run on siding E. The rope extremities are now about opposite the front and rear cars of the loaded train at F, and can be attached at the forward and rear ends and hauled to the adit. Other dispositions of tracks and switches are sometimes employed, but none that have proved themselves so efficient.

The rope is taken around curves by either of the two methods illustrated in Figs. 17 and 19. The main rope is supported as usual by rollers, placed between the rails and the tail-rope by rollers along the side of the entry, such as are shown in Figs. 15 and 16.

Figs. 40 and 40a show the improved types of tail-rope hauling-engines manufactured by the Ottumwa Iron Works, Ottumwa, Iowa. That

illustrated in Fig. 40 is known as a *single two-drum engine*. It consists of two engines with cranks at right angles, coupled to a common shaft carrying two pinions meshing in turn with two spur-wheels keyed to the drum-shaft. There are two drums, one for the main and the other for the tail-rope. This type of engine is adapted for location at either end of a haulage-plant.

It is sometimes very desirable, owing to the relative position of the workings, to place the hauling engines in the center of the mine and to operate the rope system in opposite direction from that point. To such conditions the engine illustrated in Fig. 40a is admirably adapted. Four rope drums are provided, enabling the operation of two separate and distinct tail-rope systems.

The motion of the drum in both the foregoing engines is controlled by an improved cone friction device, the operation of which is simple and effective. These engines are also provided with automatic indicators, the purpose of which is to enable the operator to determine the position of the train at any moment, and consequently to govern all stoppages, and provide for variations

in grade. I append a table of the tractive power of these engines.

<i>Tractive Power of Hauling Engines (Approximate)</i>									
Cylinders.		Pipes.		Drum Specifications.				Load in tons of 2000 lbs., on a grade of	
Diameter in inches.	Stroke in inches.	Diameter of steam inches.	Diameter of exhaust inches.	Diameter in inches.	Length in inches.	Capacity of each in feet of rope.	Diameter of main rope, inches.	Diameter of tail rope.	
8 1/2	12	8	3 1/2	36	36	2500	24	24	10 per 100.
10	12	8	3 1/2	42	36	3400	24	24	20 per 100.
10	16	8 1/2	4	44	36	4000	24	24	30 per 100.
12	16	9	4 1/2	48	36	5000	24	24	
40									
50									
60									
80									

III. *b.* THE COUNTER-ROPE SYSTEM.—This is closely allied to the tail-rope system, the chief distinction being that in this case the tail rope is replaced by a main rope operated by a separate engine. Briefly, the counter-rope system consists of two stationary engines, one in the mine and one outside, alternately pulling a train of cars in and out by means of two ropes, the one attached to the forward and the other to the rear end of the train. One rope is thus wound over the hauling-drum while the other runs freely of its drum, which, for the time being, is disconnected from the engine. The details of this system being almost identical with those of the tail-rope system, I content myself with describing in brief a counter-rope plant in actual practice.

Fig. 28 illustrates the general plan of a mine in the Monongahela region. The main hauling-drum and engine are located outside the mine near the adit, while the other engine and drum are located about 600 feet from the parting at the end of the entry. The rope is guided around the curve by six iron sheaves 18 inches in diameter, placed outside the track (see Fig. 18) about 10 apart. Guardrails are, as usual, placed at this point to prevent the cars from leaving the track. The ropes in this plant are connected end to end by means of a chain, as shown in Fig. 37. The number of these connections varies according to the length of the train. The maximum number of cars hauled by this plant is 40, representing about 80 tons; in this case four connections are made. The length of the line is about 6,600 feet, and the rise about 1 in 50. A crucible steel rope, $\frac{5}{8}$ of an inch in diameter, is employed, and lasts about one year. The rope is supported every 20 feet by 6-inch rollers. The tail-sheave is 48 inches in diameter. The main drum is 60 inches in diameter, and is operated by a 16-inch by 24-inch engine geared 1 to 2 $\frac{1}{2}$. The fly-wheel weighs 5 tons.

This system has been extensively applied in Europe, the conclusion of European engineers



FIG. 34.

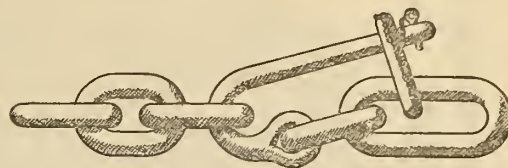


FIG. 35.



FIG. 36.

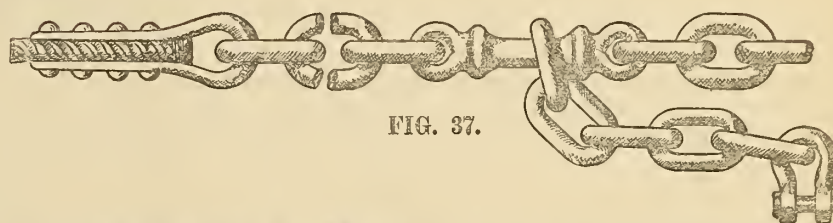


FIG. 37.



FIG. 38.

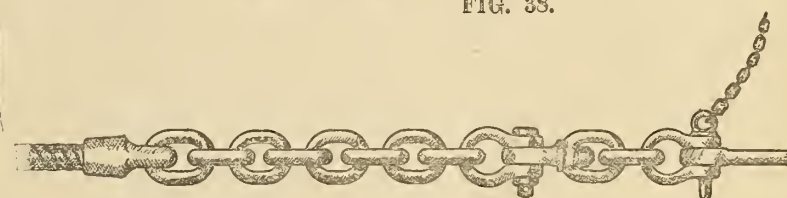


FIG. 39.

being that the counter-rope system forms the cheapest method of underground transportation where the output exceeds 800 tons per day. This is undoubtedly true where only the main entries are operated, but if we include the working of side-entries the above conclusion is probably at fault.

III. *c.* THE ENDLESS-ROPE SYSTEM.—Endless-rope haulage may be divided into two systems: 1. That in which the motion of the rope is continuous in one direction; and 2. That in which the rope is driven alternately in opposite directions.

The first system is that known as the "double-track." In this case one track is used for ingoing and the other for outgoing trains. The rope is led from the engine-drum to the centre of one track and continued to the terminal, where it passes around a tail-sheave placed at the end of the engine. In the latter, or "single-track" system, the hauling side of the rope passes from the drums midway between the two rails to the terminal, where it is led around a similar sheave, and continued back to the engine along the side of the entry. The latter is practically the tail-rope system, used in connection with an endless wire rope. The chief advantage of the endless system is that it permits stopping or starting the train at will without interrupting the motion of the engine, and

in this manner does away with the system of signals necessary to a tail-rope plant. A familiar application of this system is that of cable-railways for passenger traffic, which in fact is a complete and extensive endless rope haulage-system.

In this system, as in the tail-rope, curves are passed most advantageously by the use of small iron wheels 12 inches to 24 inches in diameter, placed as shown in Figs. 17 and 19, their distance apart being governed by the radius of the curve.

The operation of the side-entries and branches in the single-track system is similar to one of the tail-rope methods (see Fig. 29), except that in this case the rope is continuous. Fig. 41 represents the method of operating a side-entry in connection with the double-track system. Let us suppose a train of empties at X. Should it be desired to run them into the entry B the switches are set at the branch D, and the grip being attached to the moving rope, the cars are taken to F, where they are loaded and switched to the other track by E. Here the rope is gripped and the cars are taken to the junction with the main entry at K, where the rope is detached from the train, the latter being allowed to continue by its own momentum to the return track Y. The rope is again taken hold of, and the cars are carried to the adit. Should it be

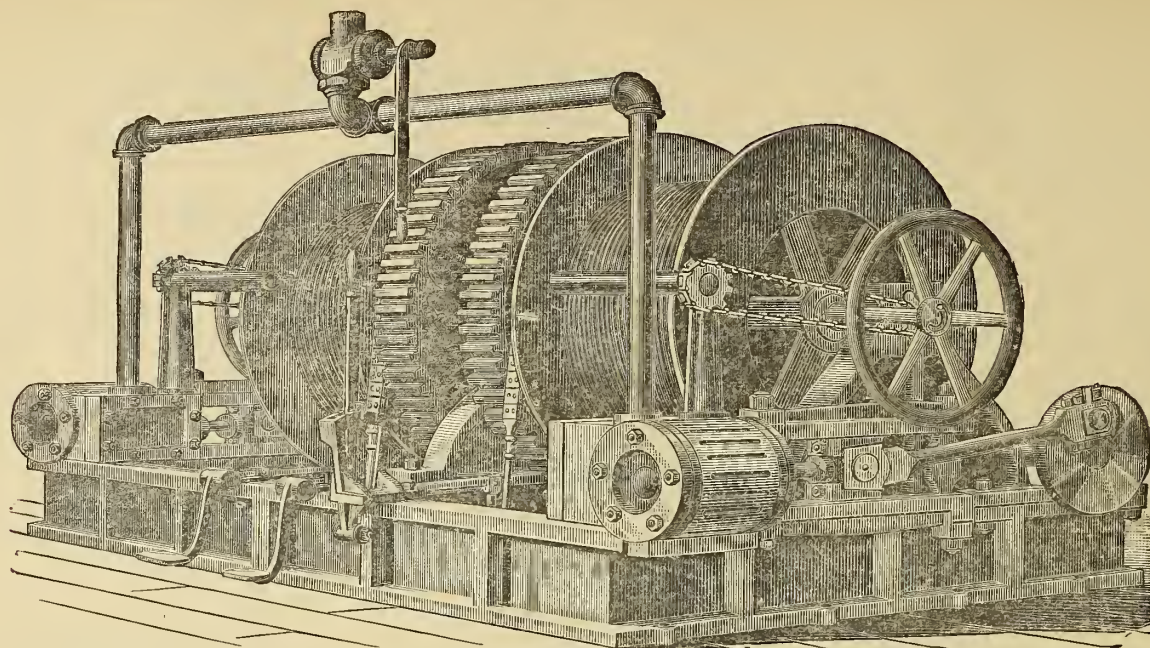


FIG. 40.—Two-drum Reversible Hauling Engine.

desired to run the cars direct to A the cars are detached from the rope just before reaching the entry B, and pass this point by their momentum; the rope is again gripped and the cars are drawn to switch E.

(To be Continued.)

Estimating Mine Values.—It may not be impossible to establish some basis upon which the valuation of mines should rest. At any rate it is a subject which should be more generally understood, because it is in the direction of placing mining upon fair and just grounds, and seeks to prevent the expenditure of more money upon mines than they are reasonably worth. As a rule there is little danger of a mine being over-estimated. It is probable, however, that any such a basis would not be satisfactory to those who expect to realise enormous profits from dealing in mining stocks, instead of being satisfied with the actual yearly profits obtained from a mine. Eventually, no matter how they are twisted and turned, all the factors in the mining problem are resolved into these three: cost, production and risk. It is not impossible to state the two first mentioned with something like mathematical exactness; the latter must necessarily depend upon a variety of circumstances, peculiar to each case, though a few general rules applicable to all cases, might be formulated. It is this factor of risk which causes the English investors to place so great a value upon the record of a mine. They correctly argue that a fairly well developed mine—if a fissure vein—is well high uniform in its characteristics, and that its future production can be judged from its past. Consequently the record of a developed mine is considered nearly if not quite erasing the factor of risk, leaving it a problem which involves only cost and production, in which the future of both can be stated with a reasonable degree of certainty. That our English friends have not always been correct we know from the fact that they have purchased mines, because they had a record, but which were almost exhausted. Some of them have also learned that the question of management is intimately connected with the risk factor. Whatever may be said to the contrary the record of a mine should be given a prominent place in estimating values, though it should never be forgotten that every ton of ore extracted to make that record, by just that amount reduces

the aggregate of the contents of the mine; and when all those contents are gone the mine is worthless. It is this question of risk which is the stumbling block in establishing a basis for values. But the cost and production factors are too often largely neglected. Cost includes not only the first cost of the mine, but interest on the money, the cost of development, if any be necessary, and the cost of extracting and marketing the ore. Production should not only pay all of these expenses, but provide a sinking fund to pay back the original investment before the exhaustion of the mine, and should pay a profit in addition to offset the question of uncertainty; and that profit should be, more or less, just in proportion to the extent of the risk. An illustration of how cost, production and values were in one case correctly estimated, came to the notice of the editor very lately. Seven years ago a report was made upon a mine which at that time had a shaft nearly 200 feet in depth and drifts both ways from the shaft at 50, 100 and 150 feet from the surface. These drifts aggregated 750 feet in length and opened up a vertical block of ground, which measured 150 x 250 feet. The thickness of the ore was 2 feet, and the measurements of the shoots indicated that about one-half of it was pay ore, having an average assay value of \$32 per ton. This ground, then, would yield 3,750 tons of ore having a total assay value of \$120,000. The cost of stoping and hoisting was placed at \$3 per ton, and the cost of shipping to market and treatment was placed at \$15 per ton, while the discount on the assay value of 10 per cent. was \$3.20 per ton. This, then, made the cost of obtaining each ton \$21.20, or \$79,500 as the total cost of obtaining \$120,000, leaving a profit of \$59,500. As one year was required for the extraction of the ore, the interest on the investment, amounting to \$6,000 per annum, was deducted, leaving the total net profit of \$53,500. The mine then was worth at least that much, as could be determined with a reasonable degree of certainty. But now comes in the calculation of the value of the chance to find more ore in the mine than that shown in the reserves. It was the factor of risk. The ore shoots presented every appearance of permanency, or continuity from one drift to the other. As the vein was covered with "slide," nothing could be told from surface indications regarding the probabilities of finding ore in the lode beyond the drifts. Assuming

that the ore should continue in value and quantity at depth as it was shown in the drifts, and allowing for increased cost of working as depth was gained, each ton of ore below the lower workings would give a net return of \$6, and the yearly product could be made to reach 5,000 tons, giving a yearly return of \$30,000 net. Of course, the ore might, in the unseen portions of the mine, decrease in quantity or quality, or both, and it might, on the other hand, improve in one or both ways. The assumption, however, considered all that could be hoped for, and ordinary prudence dictated that the estimates should be cut in two, making the yearly income of the mine \$9,000, after deducting for interest on investment. Out of this \$9,000 had to come whatever amount was desired to set aside for the sinking fund, and the profit to pay for the risk. The life of the mine was placed at ten years, during which time the sinking fund would have to amount to \$50,000, or \$5,000 per year, leaving \$4,000 yearly profit to offset the risk. Seven years have elapsed, and the purchasers have just given the information that the mine has paid for itself, besides interest on the money invested, and gives as good promise of future profits as it ever did. The incident is noted to show one method of arriving at mine values; incidentally, it shows two other opportunities of profit in mining; one is for the man who takes a good prospect and intelligently develops it into a mine, and the other is the chance which exists for the investment of money in legitimate and profitable mining.

Ventilation with Mine-Gas.—The Cincinnati Colliery, near Pittsburgh, is ventilated by mine-gas—that is to say, the fire which gives the upward current in the upcast shaft is a mine-gas flame. Formerly coal was used; but it having been found that a clay seam in the mine gave out a considerable quantity of gas, it was decided to use the gas for ventilating purposes, thus compelling fire damp to do useful work. Pipes are sunk in the clay, and the gas rising in them is collected and conducted in pipes to the bottom of the upcast shaft, where it is burnt.

E. GAUJOT,
MINING ENGINEER,
BELLEVILLE, ONT.

PHOSPHATE.

In General.

The question of using ground phosphate in the raw state still continues to attract considerable attention, and Professor Saunders is now making preparations for an elaborate series of tests on the Government Experimental Farm during the coming season, the results of which will be made public. The manure question is one of the most important connected with agriculture, and whatever will tend to an increased production of crops must necessarily demand the attention of the agricultural community. Phosphate rock has now, to a great extent, been substituted in place of bones in the manufacture of superphosphate and commercial fertilizers, by treatment with sulphuric acid, for the purpose of rendering it soluble. Phosphoric acid, as contained in crude phosphate, has been considered insoluble in water, but water containing carbonic acid, ammonia, or common salt, has the power slowly of liberating the phosphoric acid from its basic lime, and rendering it soluble for plant food. But the slower operations of water to render the phosphoric acid available for crops, can be largely increased by mixing the pulverized material with fermented manure, or peat. This system has for several years been carried on in the United States, in connection with cotton and tobacco plants, both of which being very exhaustive to the soil, require very stimulating fertilizers to restore the growing properties essential for plant life of the land. It is to be hoped that our farming community will see the necessity of adopting some measures for keeping the land required for the growth of cereals, up to its standard, by using fertilizers, and it does seem anomalous that this rich natural product at our very door, should be shipped away to the United States and Great Britain without its value being recognized by our own farming community.

Mr. John Dyke, Canadian Government agent at Liverpool, in his annual report to the Minister of Agriculture, makes special reference to last year's British market. He says: "The total export from Montreal during 1887 has been 20,349 tons against 19,298 tons in 1886. Prices have rather gone back somewhat, owing to trade depression, and a large supply of low grade phosphates; 80 per cent. strengthened as the year advanced, and closed firm. The average price for the year is about 1 per cent. per unit, ex-ship, United Kingdom. A good proportion has gone to Germany and also to Ireland at proportionately higher prices, but has not compensated for the additional freight that had to be paid. Lower grades have been selling at 9½d. for 75 per cent., and 8d. for 70 per cent. The future outlook for Canadian phosphates is favorable, one shilling to 1s. 1½d. could now be obtained for 80. per cent. for this next season. There are slight signs of prices strengthening. South Carolina phosphate (which is used largely by manufacturers here) has slightly varied in price. The average for the year is about 7½d. per unit, ex-ship, United Kingdom. Belgian phosphates have been sold at lower prices than hitherto, 40 to 45 per cent. ranging from 5d. to 6d., and 50 to 60 per cent. from 6½d. to 7½d. per unit, ex-ship here. Of a newly discovered phosphate (Somme) only

moderate quantities have as yet been offered, but sales have been made at 10½d. for 70 to 75 per cent., ex-ship here. The new source of phosphoric acid from basic slag has attracted considerable attention. This material contains somewhere about 17 per cent. of phosphoric acid, equal to 35 per cent. tribasic phosphate. It is found when reduced to fine powder to be easy of assimilation by plants, especially where the soil is of a peaty nature, and can supply the necessary carbonic acid to assist in the solution of the phosphate. In Germany the use of this has been rather large where there are big tracts of land, and it can be used to advantage. To a limited extent it is being introduced into Ireland and other parts of the United Kingdom at comparatively cheap prices."

The Government topographical survey of the phosphate region of the Ottawa Valley, begun last summer by Messrs. E. D. Ingall and J. White, will be resumed in a few weeks. It will be remembered that this important work was somewhat abruptly terminated last season by the severe accident to one of these gentlemen at the Little Rapids Mine.

A prominent shipper who has just returned from Great Britain states that the present outlook of the fertilizer industry there is much brighter than it has been for years. Manufacturers, however, feel the loss of the American superphosphate trade which has fallen off in two years from 40,000 to nil. It seemed absurd to send the rock to England and bring it back manufactured.

Market.

Markets seem strong for 80 per cent. and over, but lower grades are difficult of sale owing to the competition of the French phosphates. The Curacao, which is the principal opponent of our high grade, is not being produced this season. This strengthens our market materially. The demand for our ground phosphate, 60 to 65 per cent., is increasing in the United States and quite a quantity can be placed there.

Du Lievre.

Owing to the almost impassable state of the roads and the consequent cessation of traffic both up and down the river, our notes from this district are necessarily fewer than usual.

The management of the High Rock Mining Co. purpose utilizing the electric light to illuminate their workings next fall.

The Dominion Mining Co. intend pushing their operations strongly this season. They will engage a larger number of men than they had expected to, having struck some rich phosphate seams.

Negotiations are going on just now for the sale of some phosphate lands in this district, which, if successful, will result in a large amount of capital being brought into operation.

Mr. W. H. Dickson will do some phosphate mining shortly on his lots in the 5th and 6th ranges.

Templeton District.

We are informed that the Templeton and Blanche River Company, of Montreal, will shortly increase their capital stock. A little over 150 tons of good ore at present awaits shipment from their property.

It is rumoured that the celebrated Goldering property has been sold to American capitalists, and that mining will shortly be resumed on these lots.

As soon as the snow leaves the ground the Anglo-Canadian Company will further explore their lots in the Gore of Templeton and Wakefield.

Perth District.

At the Otty Lake Mines, the Anglo-Canadian Company is changing its operations to contract work instead of day labor.

Kingston District.

Captain W. D. Moore, of Hurley, Wisconsin, who, sometime ago purchased 2650 acres of mining lands in this district, has had a number of men under the direction of Mr. J. Sloan, prospecting, taking out timber, and making other preparations for the commencement of active operations at an early date. All the necessary buildings to accommodate a large force will be immediately erected, and the latest and most approved machinery will be put in before the 1st of June. The surface indications are rich and abundant, and a number of pits and shafts have been opened. Mica and magnetic iron is also found on the property.

Work on the Foxton property has been carried on during the winter with satisfactory results, about 200 tons of ore having been mined and hauled to Kingston. The vein continues to improve as depth is attained.

MINING NOTES.

We shall be greatly obliged to mine owners and superintendents for such authentic reports of their operations as may concern shareholders and the public.

Nova Scotia.

Operations at the various collieries are still much retarded by the inability of the Inter-Colonial Railway to furnish adequate rolling stock, and mainly on this account managers have not been looking up new business. When spring opens, and the English through traffic begins to slacken off, more coal will be moved.

At the Drummond Colliery great preparations are being made for an active season. The company has secured a large portion of the Grand Trunk contract at an advance over last year's prices. Freights are somewhat higher, however, which will counterbalance the advance in coal. The shipments from this mine are expected to figure close upon 1000 tons per day.

At the Vale Colliery both pits are working full time, banking when cars are not to be had. This company has also secured considerable trade this season with the upper provinces. Although heretofore most of their coal has gone to the I. C. R. and to local consumers, it is much sought after by iron workers for smelting, and gas producers for working iron and steel. The company are sinking a new lift, 600 or 700 feet, to the deep on the McBean seam, and have unwatered the six foot seam which was allowed to fill up at the time of the strike. About 60 pairs of men are working on this seam, mostly Belgians. About 100 of these men have been imported to work these mines, and it is said that they are doing well.

At the Acadia Mines, work is dull, owing to scarcity of places—so it is said. Some alterations are being made in the hoisting gear, new boilers are being put in, and in a few weeks the company will be in a position to do a large output.

The parties, who have acquired the Black Diamond Mines, from the N. S. Coal Co., have relaid the travelling slope, and utilized one of the old locomotives as a hoisting engine. The present output is in the neighborhood of 50 tons per day.

Since the explosion in January, everything is very dull at the old Albion Mine. The "Tom" pit is working, but owing to lack of places and scarcity of men, very little coal is coming up. A large number of miners have left for the North-West, and others are going in a few days. The recent accident, and the condition of the adjacent mines, surrounded as they are by fire and water, has made the men timorous and unsettled, and it will be some time before a large quantity of coal will be got. Nothing has been done on the 3rd seam, since the explosion, beyond blowing down the roof of the air way connecting No. 1 and 2 slope, this, it is hoped, will enable them to shut off the slope in which the fire is located, and perhaps save the other, if the fire has not penetrated too far into it. Investigations will shortly be made to find out the condition of this slope. The work of unwatering the Foord Pit continues, but owing to continued heavy rains, very little progress has been made.

Work at the Springhill Mines is reported to be very dull. It is rumoured that the company has lost some of their large contracts. The "syndicate" pit is closed down and the others working short time. All sorts of reports are current as to the cause, but nothing definite is known beyond the fact that the company has not sold as much coal as usual.

One of our correspondents writes: "All the talk in mining circles here is about the Commission appointed to investigate the recent explosion at the Albion Mines. Most people think it is only a dodge of Mr. McColl, M.P.P., to curry favor with the miners, and secure their vote. There are no experts on the committee, which is composed of members of Parliament, who have called two or three witnesses who know as little about the matter as they do themselves. A good many think the whole affair a farce."

A charcoal furnace is being built on one of the iron properties up the East River by an Englishman who has done considerable prospecting. It is said the ore is of a very superior quality. Considerable ore has been shipped to the N. S. Steel Co. at New Glasgow and proved of excellent quality.

The total yield of gold for the past month has been 218 ounces. Some of the mines are doing very well. Edgerton and Rawdon are working full time. Edgerton will turn out 80 ounces, the product of 20 men.

A good deal of prospecting will be done at Fifteen Mile Stream this season, as that locality is looking up.

A force of prospectors will be sent in as soon as spring opens, and a crusher will be built on the Twelve Mile Brook.

Large areas have been taken up on the Twelve Mile Brook, and at Sheet Harbour, and valuable discoveries are reported at the old "Board Camp Mines."

Probably the first manganese mine in Canada was opened at Fanny Cape in Hant's County nearly 30 years ago, and was for a number of years the first mine in America, but it has gradually failed; has changed hands a number of times, and has never been a very valuable property to any of its owners; the output now is small and of inferior quality compared with the ore raised in New Brunswick.

Manganese ore in small quantities has been raised about Walton in Hant's County, but never in quantities to warrant vigorous operations being carried on.

There is also a mine in operation near Truro which is producing a small quantity of fair quality ore. This mine has recently changed hands and may now be operated more successfully. It has not, heretofore, been a bonanza.

The Crow's Nest Gold Mining Company (limited) has been organized in London with a capital stock of £100,000, shares £1 each, to purchase the mining property and estate known as the Crow's Nest Mines, or otherwise to acquire and work the property.

The total amount received by the mines department last year, from coal royalties, was close on \$120,000. Spring Hill takes the place of honor with \$30,000, followed by Sydney Mines with \$18,084; Acadia, \$12,600; Gowrie, \$11,776; Intercolonial, \$11,500; International (B. Port) \$7,296; Victoria, \$6,635; Caledonia, \$6,230; Glace Bay, \$5,976; Reserve, \$4,833; Block House, \$2,654; Chignecto, \$854; Halifax Coal & Iron Company (C. B.) \$573; Grant & Co., \$102, and Ontario \$60.

New Brunswick.

We are indebted to our correspondent for the following brief sketch of the Markham Manganese Mines: "These mines were opened by the late Wm. Davidson of St. John, about 26 years ago, worked by him a year or two, then sold to a Boston syndicate, who operated the mines up to about 1873, when they were sold to the present proprietors. Major Markham has had the management of them since 15th April, 1866—22 years. About 30,000 tons of Manganese has been shipped—about $\frac{2}{3}$ to Europe and $\frac{1}{3}$ to United States. I understand these to be the only Manganese Mines on this continent that have been in steady operation for more than a few years. The mines are situated south-east of Sussex Station on the I. C. R. and are reached by a good turnpike road."

In Albert County, ore of excellent quality is found, but it has not yet been discovered in paying quantities.

A manganese mine has been in operation in the parish of Waterford, King's Co., and a small quantity of ore has been raised, but the mine has not been profitable and is now closed.

Ore has also been discovered in parish of Studholm, Kings Co., about eight miles north of Sussex Station, said to be in large quantities; it is also said that the property has been bonded to American Capitalists for a large amount but we are told no sale has yet been made.

The Montreal Manganese Company of St. John are chiefly engaged at present in prospecting their property, and we are informed that they have an extensive deposit of rich ore, particularly at their East Mountain Mines, Onslow. Last season two jigs for cleaning the ore were worked, and these will again be worked this season by steam power.

Quebec.

Mr. Parker C. Choate, of the Bartlett Smelting Works, Portland, and Mr. Brigham, representing New York and Boston capitalists, have, during the past few weeks, paid two visits to the South Ham Antimony Mine. Mr. Choate has had a quantity of the ore smelted, which he pronounces very pure, being free from tin, arsenic, copper, zinc or lead. He is of opinion that large quantities of the ore can be taken out and profitably crushed, concentrated and smelted on the spot. If successful in their negotiations with Dr. Reed, the owner, works will be at once put up for the manufacture of metallic antimony.

It is reported that Mr. Charles Lionais has sold the Hervey Hill Copper Mine, in the Township of Leeds, to a Glasgow syndicate, and that extensive preparations are being made to work the property on a large scale. The car loads of the ore taken out last fall have been pronounced first class, averaging 40 per cent. metallic copper.

There are numerous enquiries in this section of the country for the purchase of copper locations, and many of the old mines will again be opened up if the present market price continues.

The price of chromic iron with other substances, having increased in value, we are informed that the deposits of Leeds, Thetford and South Ham are to be worked extensively during the summer. Part of the ore will be sent to Birmingham, Alabama, where the mineral is extensively used in the manufacture of steel.

We understand that during the past three months the average quantity of marketable mica taken out of the Villeneuve mines has been close upon six hundred pounds per month, and from latest accounts the production promises to exceed that amount during the present month. Mr. Neil Cochrane has all hands working on the outside slopes, work in the tunnels having been abandoned for the present. Large crystals of a very superior quality continue to be taken from the very surface. About thirty men are at present employed at these mines.

The new cobbling factory and other works being erected at considerable outlay by the Scottish Canadian Asbestos Co., are rapidly nearing completion. When in operation the new system will, it is thought, result in the saving of many thousand dollars in the manipulating and manufacturing of the mineral.

The weather has been very backward of late in the Asbestos Mining District and not much has yet been done. Things are being got in shape for active operations, which will be prosecuted vigorously after 1st May, but not very much can be done before that date as there is still considerable snow in the vicinity. There is a good and steadily increasing demand for asbestos. Prices keeping firm, with an upward tendency at this season.

Mr. Alexander Ward will shortly open up the property owned by Mr. H. W. Johns of New York, on lot 26, range A., Coleraine.

Captain Williams of the Rockland Slate Quarry will also develop an asbestos property on lot 32, Range B, owned by Mr. Arthur Murphy.

Our correspondent also states, "that parties are here from Paris and Germany enquiring for asbestos and asbestos mines. They speak in the highest praise of the quality of the Canadian mineral."

The following estimate of the asbestos output for 1887 may be taken as correct:—

	Tons.
Asbestos Packing Co.....	850
Johnson & Co.....	520
Argyle Can: Asbestos Co.....	340
Scottish ".....	210
Frechette Mining Co.....	220
King Bros.....	120
Irwin, Hopper & Co.....	90
Coleraine Mining Co.....	50
A. H. Murphy.....	10

An exchange writes. "There are two inherent evils in asbestos mining in Canada which prevent this industry being as profitable to the miner as it would at first sight appear. The exorbitant price charged for mining locations by their proprietors, or by the promoters of the companies destined to work them, causes an amount of outlay of capital that seriously cripples the resources of the company and renders the dividend payable often infinitesimal, even if the mine turns out a paying one; and secondly, a doubt always exists as to whether (in view of the uncertain nature of the veins of chrysotile) underground mining will pay expenses after the surface deposits are exhausted and quarrying is no longer possible. With these two drawbacks in view there is always an element of uncertainty present in asbestos mining, and as a consequence it is difficult to divert Canadian capital in this direction."

Capitalists on the look out for an investment in mineral lands in the Eastern Townships cannot do better than read carefully the masterly report on the geology of the counties of Compton, Stanstead, Beauce, Richmond and Wolfe, written by Dr. R. W. Ellis, and recently published by the Geological Survey. Great progress has been made in the development of this section of the Province, evidenced by the construction of the several lines of railway which centre in the Town of Sherbrooke, as well as by the opening up of hundreds of miles of settlement roads, by which large areas, formerly inaccessible, have now become comparatively open to investigation. The report comes from so eminent an authority and contains so much important information bearing on the mineral resources that it cannot fail to be of immense practical value to the district.

Ontario.

Our Red Rock correspondent writes: "The Town of Nipigon is located on the line of the C. P. R., and situated within a few yards of the river of the same name. Plenty of minerals abound in this vicinity. The river banks and lake shores have been explored to a considerable extent and several locations are taken up. Iron in large quantities has been discovered, silver is known to exist, and gold bearing quartz has been found."

Our Belleville correspondent writes: "A couple of days ago I had an opportunity of examining the Richardson Mine, and I would ask your readers to accept with caution very much of what has been said lately about the recent finds at this property. About sixty feet, south by east of the old shaft, a new one has been started on what appears to be the beginning of a vein having a leader under a granite hanging wall, dipping north at an angle of about 78°, and another leader on an apparently foot wall dipping at an angle of about 70°. There is a false horse between the two leaders, the footwall being felsite rock. This shaft is 26 feet deep, and at the bottom the two leaders are coming together very rapidly. This may form a vein or run out altogether, as the whole Richardson Hill is a big upheaval or dyke, and has no regular formation. The matrix of the two leaders, or would be veins, is a hornblende rock, having the appearance of gneiss; this same formation is visible in the old shaft, near the place where the old celebrated pocket was first struck, and here the rock shews considerable free gold. This rock as well as the ore coming out of the new shaft is being taken to the stamp mill at Bannockburn.

At the Robertsville Mines, Wm. Roach is still prospecting with a diamond drill. The results are said to be satisfactory.

A correspondent to the *Emigrant* thus describes the Vermillion Gold Mines recently discovered in the Sudbury district, and patented Messrs. R. J. Tough and Jas. Stobie:—

"This discovery was made in the township of Denison (lot 6 in the 14th. concession), about 23 miles south of Sudbury Junction, within 2 miles of the Sault Ste. Marie branch, on the west side of that line. It consists, at date of my visit (March 10, '88), of one strongly defined gold-bearing quartz vein, in the green slate, apparently close upon the junction of the granite, which prevails to the east. This particular lode is distinguished from another lode or outcrop as "No. 2." The "No. 2" vein has been traced for a distance of 89 chains, or the entire width of two lots. Its magnetic direction is north, 52 E., dipping south-east 73 degrees. The average width of this vein is 22 to 36 inches. The gangue is fine grey and white quartz, rich in native gold. A shaft is being sunk, and it has now attained a depth of 30 feet. From this, an intermediate distance, splendid nuggets of gold have been extracted, and average samples of quartz give results ranging from \$200 to \$1,000 to the ton of 2,000 lbs. Nor is this free gold confined to the vein: on the contrary the country rock on either side appears impregnated with it for a distance, in places of over 6 feet. Excavation work here at date of inspection was as follows: depth, 15 feet; length, 120 feet. A sample of pyrites from this lode, or deposit, assayed \$17 in silver, and also a percentage of nickel; while the gold ranges from \$36 to \$1,500, to the ton 2,000 lbs. Beyond the work already described nothing has been done on this location. A log shanty for the accommodation of the miners stands on the production of No. 2 vein, at a distance of 700 feet from the shaft. Owing to the great depth of snow (nearly 5 feet) it is difficult to closely examine the topography or geology of the country. The surrounding country generally is, however, high and rolling—with frequent exposures of granite and green slate. Most of the township has been overrun by fire, but a large percentage of the burned pine-tract is yet sound. The soil is clay loam and clay subsoil. Dennison township is in Algoma District. It is traversed by the Vermillion River and by the "Sault" branch of the C. P. R. A stock company has been formed to work this mine. The principal Canadian owners are the original investors with several Chicago men, including a Mr. Foster and Hill. Their organization is not yet complete."

Port Arthur District.

The usual break up of the roads in spring has temporarily interrupted communication with the mines. The Beaver, Badger, Silver Mountain, Caribou and Crown Point mines are working steadily with nothing remarkable to

note, and so soon as travelling is good a strong force will be at work at the Peerless, Little Pig and Palisades mines.

The Government bridge over the Kaministiquia River on the road to the mines has now been thoroughly renovated and strengthened at a cost of several thousand dollars, and a gang will soon be at work completing the road substantially as far as Whitefish Lake to enable those who have prospects further to the south-west a chance to go on with development.

The surveys performed for the Government last winter extended as far as the famous Hunters Island iron region, which is undoubtedly a continuation of the famous Vermillion iron range, and has been taken up in large tracts by our enterprising American cousins.

There is a steady demand both from England and the States for both mining and other lands in the vicinity of Port Arthur.

General McArthur has returned from Chicago and has gone down to Nipigon Bay to inspect his sandstone quarries, where he has a force of thirty men at work getting out this handsome stone, which is now in good demand in Chicago and elsewhere.

Application has been made for a monopoly of the supply of natural gas to the town of Port Arthur.

The very interesting article on the Rocks of Lake Superior, by Peter McKellar, read before the Royal Society of Canada, is a most valuable addition to our mining knowledge, and coupled with the writings of Messrs. Ingall, Coste and Lawson, of the Geological Survey, afford a good insight into the Thunder Bay mining region and its resources.

Manitoba and North-West Territories.

Mr. W. Case, experienced in locating oil wells in Pennsylvania, has found oil in considerable quantities, at a depth of 50 feet, in the Riding Mountain district. The party examined a district three or four miles square, at a point about eighteen miles from Lake Dauphin and about fifty miles from Strathclair Station. From the appearance of the rock strata and various surface indications, this gentleman is convinced that this is an oil district.

Mr. James Coffman has a gang of miners working on one of the claims recently sold at Tunnel Mountain. The claim is across the Kicking Horse, north of the track. Mr. De Wolf is at present negotiating with him for the construction of a 50-foot tunnel to be put in the Monarch Mine, and as it is almost sure the contract will be let a lively time is expected in that vicinity this year. Joe Buchard has gone to work with a gang of men on his claim, which is a continuation of the Coffman lead. The same gentleman will begin work at the Ottertail about the 10th of the month.

The miners are very anxious to see a smelter erected for the reduction of the ore, and would be glad to see it built in Calgary, which is their natural base for supplies.

British Columbia.

Advices from Victoria report that 2,727 acres of coal lands in the Nanaimo and Cedar districts have been bonded in London. This tract of land is said to be amongst the finest coal

and mineral deposits on Vancouver Island, and as they are contiguous to the Vancouver and Wellington mines, being the same quality, need no further reference to their value.

In conversation with a number of Yukon miners we learned that nearly all of them held the opinion that the wash gold found on Forty Mile creek and the Tananah on the northeast, and Copper river on the southwest. They believed that if the prospectors going up the coast would ascend to the headwaters of the latter stream, they would find as good, if not better, diggings than those on Forty Mile. The Rocky Mountain range cuts through the Coast range above Copper river, and it was near that point they should look for the fountain head, as it is a well established fact that the richest mines in America are found in the main Rocky Mountain range.—*Alaska Free Press.*

The following letter, under date of 6th April, from Dr. A. R. C. Selwyn, Director of the Geological Survey, has been received by Dr. G. W. Orton, Winnipeg, and explains itself:—

"I am in receipt of your letter of 3rd inst., asking me to give you in a general way my opinion of the prospects of mineral development in British Columbia. In reply I may say that I have always considered the region from the Fraser River eastward to the Kootenay & Columbia valleys one of exceedingly great promise for the discovery of rich mineral bearing veins. The chief, though not the only reason I have for this opinion is that the geological structure and conditions there correspond with those to the States of Idaho and Eastern Montana, two of the largest gold and silver producing states of the Union, having produced respectively in 1886, according to the Mineral Statistics of the United States, as under: Idaho—gold, \$1,800,000; Silver, \$3,600,000; Montana—gold, \$1,425,000; silver, \$16,825,000. There seems no reason why corresponding results should not be attained in British territory over corresponding areas. I have myself traversed the region in several directions and last summer I spent some days examining some of the mines opened near McCallwaet on the line of the C. P. R. and all I saw tended strongly to confirm the opinion above expressed, as also do the assays of numerous specimens from the region made in the Survey Laboratory by Mr. Hoffman. A list of some of these is appended for your information."

A Genuine Smoke Consumer.—There is now in operation at the works of the C.P.R., Canadian Rubber Company, waterworks, etc., Montreal, an excellent device for the consumption of smoke, indeed it is pronounced by the first authorities in the country to be the best for the purpose that science has produced. As exhibited at the C.P.R. and waterworks no smoke issues from the stack except at the moment of firing or "pushing back," when a thin stream of colored vapor issues, and ceases when the fire doors are shut. The apparatus is very simple—consisting of iron deadplate damper and air chambers—which are placed at back of the bridge any night after day's work and in a few hours a certain regulated quantity of air from the ashpit is taken by the adjusted damper into the air chamber and passing out therefrom in finely divided streams mixes with the gases at the point where they are most highly heated, igniting them and consuming what would otherwise pass into the stack, in the form of black smoke. It is difficult to conceive of any objection to such a device. It is simple, inexpensive, cannot get out of repair, needs no attention when once set, augment and equalizes the heat, improves the draft and must save a large percentage of coal. If Cape Breton coal gives off 16 per cent of smoke and this is utilized as fuel instead of escaping into the atmosphere the saving is clear. Again, the deposit of soot is done away with, which presses the heating power of the boiler plate. Evaporation tests

with Scotch coal shew 11 oz. water per 1 lb. coal. In the externally fired boilers so much in use its action is such as to reduce the issue of black smoke from seven minutes at firing to about one minute's emission of a brownish vapor. The fire chambers of this type are so varied in construction and size that the effect of the consumer is not so pronounced as in the flued type where it is as near perfection as is possible. With first class testimony as to its thorough efficiency we see nothing to retard manufacturers from adopting it; no time is lost in attaching it; the furnace proper is unmolested; no holes are made in the plate; no steam jet is used; by moving adjusting rod and closing damper the flue is as before application of the consumer and the dense smoke issues. By opening it the discharge ceases. It will be readily seen that if one stack smokes at firing and another does not a considerable percentage of heat goes into the atmosphere in the former case, and in the latter it is used, representing coal saving. The inventors and patentees are Messrs. Dobson & Brodie of Montreal, engineers, who also undertake the planning and setting of new boilers in such a manner as to cause the heat to travel five times in flued and four times in tubular before going into the stack. We understand that this firm are exclusive agents for Smalley's patent piston which is causing so much stir in shipping circles in Europe, a description of which we will give in an early issue.

Strange Things About Steam.—When water once begins to boil, it is impossible to raise its temperature any higher; all excess of heat is absorbed by the escaping as so called latent heat, and is given out again when it condenses. We often speak of seeing the steam escaping from the spout of a kettle, but this is incorrect; steam is an invisible vapor, and we can no more see it than we can air. What we do see are the minute drops of water into which the steam condenses on coming into the cool air. If we boil water in a glass flask, we shall notice that nothing can be seen in the interior; and by observing the steam escaping from a kettle, we shall notice that there is quite a distance between the end of the spout and the point where the cloud becomes visible. This cloud of steam is of exactly the same nature as the clouds which float in the sky, and which are formed by the condensation in the cool upper regions of the steam or aqueous vapor present in the air.

Electric Light in Coal Mines.—More than 2,000 electric lamps are now in use in the coal mines of England. There is a disadvantage attending the use of incandescent lamps in mines, inasmuch as they offer no indications of the presence of fire damp.

First Discovery of Coal—The interesting statement has been made by the United States Geological Survey that the first definite discovery of coal in North America can be credited to Col. Wm. Boyd, who made a report May 19, 1701, to the Colonial Council of Virginia, in which he relates the discovery of coal in the Richmond basin. The coal, however, was not worked for general sale to the public, until between 1770 and 1780.

Ontario to the Front!

A Matter of Vital Importance.

The following unsolicited opinions from your friends and neighbors, men and women, whom you know and respect, ought to carry conviction

to any doubting mind. The words of gratitude are from those who have been afflicted but are now well, and the persons giving them are naturally solicitous that others, troubled as were they, may know the means of cure. There is no reason why you should be longer ill from kidney, liver or stomach troubles. You can be cured as well as others. Do not longer delay treatment, but to-day obtain that which will restore you to permanent health and strength:

296 McNab St. North, Hamilton, Can., Nov. 2, 1886.—I had been suffering for over twenty years from a pain in the back and one side of the head and indigestion. I could eat scarcely anything, and everything I ate disagreed with me. I was attended by physicians who examined me and stated that I had enlargement of the liver, and that it was impossible to cure me. They also stated that I was suffering from heart disease, inflammation of the bladder, kidney disease, bronchitis and catarrh, and that it was impossible for me to live. They attended me for three weeks without making any improvement in my condition. I commenced taking "Warner's Safe Cure" and "Warner's Safe Pills," acting strictly up to directions as to diet, and took thirty-six bottles, and have had the best of health ever since. My regular weight used to be 180 lbs. When I commenced "Warner's Safe Cure" I only weighed 140 lbs. I now weigh 210 lbs.

Wm. S. Furber

ST. CATHERINES, Ont., Jan. 24th, 1887.—About six years ago I was a great sufferer from kidney disease, and was in misery all the while. I hardly had strength enough to walk straight and was ashamed to go on the street. The pains across my back were almost unbearable, and I was unable to find relief, even temporarily. I began the use of "Warner's Safe Cure," and inside of one week I found relief, and after taking eight bottles, I was completely cured.

W. E. Ludwig

Manager for American Express Co.

TORONTO, (18 Division Street,) Sept. 17, 1887.—Three years ago last August my daughter was taken ill with Bright's disease of the kidneys. The best medical skill in the city was task'd to the utmost, but to no purpose. She was racked with convulsions for forty-eight hours. Our doctor did his best and went away saying the case was hopeless. After she came out of the convulsions she was very weak and all her hair fell out. The doctor had left us about a month when I concluded to try "Warner's Safe Cure," and after having taken six bottles, along with several bottles of "Warner's Safe Pills," I saw a decided change for the better in her condition. After taking twenty-five bottles there was a complete cure. My daughter has now a splendid head of hair and weighs more than she ever did before.

Mrs. Jas. Burns

CHATHAM, Ont., March 6, 1888.—In 1884 I was completely run down. I suffered most severe pains in my back and kidneys, so severe that at times I would almost be prostrated. A loss of ambition, a great desire to urinate, without the ability of so doing, coming from me as

it were in drops. The urine was of a peculiar color and contained considerable foreign matter. I became satisfied that my kidneys were in a congested state and that I was running down rapidly. Finally I concluded to try "Warner's Safe Cure," and in forty-eight hours after I had taken the remedy I voided urine that was as black as ink, containing quantities of mucus, pus and gravel. I continued, and it was not many hours before my urine was of a natural straw color, although it contained considerable sediment. The pains in my kidneys subsided as I continued the use of the remedy, and it was but a short time before I was completely relieved. My urine was normal and I can truthfully say that I was cured.

Moore

GALT, Ont., Jan. 27, 1857.—For about five years previous to two years ago last October, I was troubled with kidney and liver trouble, and finally I was confined to my bed and suffered the most excruciating pain, and for two weeks' time I did not know whether I was dead or alive. My physicians said I had enlargement of the liver, though they only gave me temporary relief. Hearing of the wonderful cures of "Warner's Safe Cure" I began its use, and after I had taken two bottles I noticed a change for the better. The pains disappeared and my system seemed to feel the benefit of the remedy. I have continued taking "Warner's Safe Cure" and no other medicine since. I consider the remedy a great boon, and if I ever feel out of sorts "Warner's Safe Cure" fixes me all right.

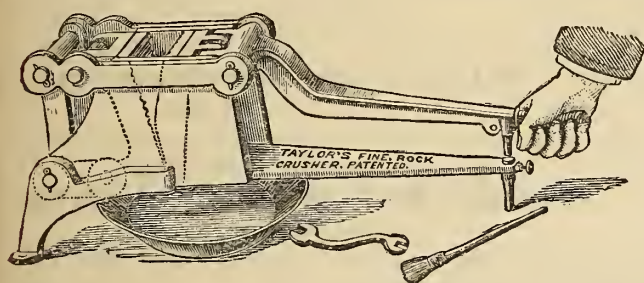
I weigh twenty pounds heavier now than ever before.

John Jones

Inventor of the Maple Leaf Lance-tooth Cross-cut saw.

(1) I understand that Mr. E. Gybon Spilsbury will present an exhaustive paper at the next meeting of the Institute upon the subject of wire-rope tramways. For this reason I will not particularize the details of this system of declines, but simply mention some of the more important features. Mr. Spilsbury has also kindly examined the copy of this paper, and I am especially indebted to him for information in connection with aerial inclines.

(2) The loading-point may be changed by varying the position of the stop-block.



Taylor's Laboratory Rock Crusher.

The Assayers and Chemists' Friend.

PRICE COMPLETE, - - - - \$25.00

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Our Patent FELT LAPLANDER is the best FELT BOOT made, as it is WATERPROOF as well as WARM.

We can supply any particular style if supplied with a sample, and shall be pleased to cater to the wants of mining and lumbermen's camps.

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VALUABLE PLUMBAGO

AND OTHER

Mineral Lands

FOR SALE,

IN THE TOWNSHIP OF BUCK-
INGHAM, COUNTY OF
OTTAWA.

1st.—Lot 28, in the 6th range, containing 100 acres, in addition to the salina of the lake.

2nd.—North half of lot 23, in the 5th range, containing 100 acres.

3rd.—Nine acres of lot No. 28, in the 5th range, with water privileges thereto appertaining, being site of mill dam, etc., etc.

The property formerly belonged to the Montreal Plumbago Mining Company, and was worked successfully for several years, until the company's mill was destroyed by fire, but the mill dam remains almost uninjured, and there are on the property several houses, sheds, etc., built for various purposes when mining operations were carried out.

The Plumbago Deposits

upon the property are regarded as amongst the richest and most extensive in the Dominion. As to the quality of the Plumbago, it has been extensively used in the manufacture of crucibles, lubricating leads, stove polish, etc., etc., and given unbounded satisfaction. This is established by the experience of consumers, and by a certificate from the celebrated Battersea Crucible Works, London, England, a copy of which is open for inspection.

MICA

has also been discovered in quantities.

The lands are in the Phosphate region, and recent prospecting has disclosed a rich and extensive deposit of this mineral. There are unrivalled facilities for transporting the ore to and from the mines by the Ottawa River and C. P. Railway. Distance from mines to Railway Station 6 miles. Good road.

All that is required to make these valuable mines handsomely remunerative is a little capital and enterprise.

The Title is Indisputable.

For information apply to

WM. H. DICKSON,
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OR TO THE OFFICE OF

THE CANADIAN MINING REVIEW,
OTTAWA.

FOR SALE. VALUABLE Copper Mining Properties

— IN THE —

Eastern Townships

TOWNSHIP OF ASCOT.

- 1st. Clark Mine, Lot 11, R. 7 Ascot 187 acres
2nd. Sherbrooke Mine, part Lots 12 and 13,
R. 7 Township of Ascot..... 329 "
3rd. Belvidere Mine, part Lots 9 and 10, R.
9 and 10, R. 8 Ascot 292 "
4th. Mining Rights in same vicinity on.... 250 "

All of the above properties lie within 1½ miles of the Village of Lennoxville, at the junction of the Grand Trunk, Canadian Pacific and Passumpsic Railways, and have been developed to a considerable extent, and veins opened 6 to 20 feet in width, yielding 3 to 5 per cent. of copper, also silver, and 35 to 40 per cent. of sulphur. These mines are only 2½ to 3 miles distant from the City of Sherbrooke, and evidently are of the same class of ores found at Copelton, only four miles distant, owned and worked by the Orford Copper and Sulphur Company, and by Messrs. G. H. Nichols & Co., of New York, which have proved so remunerative.

TOWNSHIP OF ORFORD.

- 5th. Carbuncle Hill Mine, Lots 2 and 3 R. 14, and 2, 3, 4 R. 15, 718 acres. Same class of ore as is found in the Ascot properties above described, but yielding a higher percentage of copper.

TOWNSHIP OF CLEVELAND.

- 6th. St. Francis Mine, ¼ Lot 25 R. 12, 50 acres, with dwelling houses, smith's shop, ore sheds and office, large winding and pumping steam engine, with boiler, winding and pumping gear, and about forty fathoms Cornish lifting pumps complete, railway tracks, ladders, etc., situated three miles from Grand Trunk Railway. A considerable amount of mining work has been done at this mine. A well defined vein richly charged with vitreous purple and yellow sulphurets of copper traverse the entire length of the property, five feet in thickness, yielding 8 to 40 per cent. metallic copper.

TOWNSHIP OF GARTHBY.

- 7th. Fifty-six lots of land, 2,938 acres. This property for the most part is unexplored, but copper is found on the greater part of the property. On one of the lots a vein about twenty feet in width has been found. Samples of the ore have yielded as much as 22 per cent. of copper, being also rich in sulphur. Other samples of pyrites from the same property, free from copper, have yielded as high as 48 per cent. of sulphur. The only drawback to this property is in its distance from the railway, it being about four miles from Garthby Station, Quebec Central Railway. A new line is chartered, however, which, when built, will run directly through the property.

TOWNSHIP OF ACTON.

- 8th. The Acton Mine, 100 acres, with engine, boiler, pumps and appliances. Within three years after this mine was first opened it produced nearly \$500,000 worth of copper. It is situated about half a mile distant from the stations of the Grand Trunk and South Eastern Railways.

- 9th. Brome Mine, part Lots 2 and 3 R. 4, 50 acres.
10th. Bolton Mine, two miles from Eastman Station, Waterloo & Magog Railway, 400 acres.

The above properties formerly belonged to the Canadian Copper and Sulphur Company, and were acquired by the present owner at sheriff's sale, giving an indisputable title thereto.

The whole or any portion of the property will be sold at reasonable prices.

For further information apply to

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SHERBROOKE, P.Q.,
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Information regarding mines cheerfully given. Correspondence solicited. Crown Land Business attended to.

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TO THE CANADIAN VOYAGEURS

—OF THE—

NILE EXPEDITION, 1884-1885.

NOTICE is hereby given that a decoration known as "The Khedive's Bronze Star," granted by His Highness the Khedive of Egypt to those who served with the Nile Expedition of 1884-85, will be distributed to members of the Canadian Voyageur Contingent by the persons, and at the places, as under:—

Caughnawaga Detachment,
B. de Lorinier, Esq., Caughnawaga, P. Q.
Manitoba Detachment,
By T. R. Burpee, Esq., Land Com'n Office,
Winnipeg.
Three Rivers,
By the Postmaster, Three Rivers.
Peterboro', by the Postmaster, Peterboro'.
Sherbrooke, by the Postmaster, Sherbrooke.
OTTAWA, by CAPT. COSTIN,
Dept. Railways and Canals.

In every case applicants must be accompanied by some person to testify to their identity—and sign as a witness to the applicant's receipt of the decoration.

HENRY STREATFEILD, Capt.,
Military Sec'y to the Gov.-Gen'l.
Governor-General's Office,
Ottawa, April 4th, 1888.

**TENDERS.**

SEALED TENDERS, marked "For Mounted Police Provisions and Light Supplies," and addressed to the Honorable the President of the Privy Council, Ottawa, will be received up to noon on Tuesday, 15th May, 1888.

Printed forms of tenders, containing full information as to the articles and approximate quantities required, may be had on application at any of the Mounted Police Posts in the North-West or at the office of the undersigned.

No tender will be received unless made on such printed forms.

The lowest or any tender not necessarily accepted.

Each tender must be accompanied by an accepted Canadian bank cheque for an amount equal to ten per cent. of the total value of the articles tendered for, which will be forfeited if the party declines to enter into a contract when called upon to do so, or if he fails to complete the service contracted for. If the tender be not accepted the cheque will be returned.

No payment will be made to newspapers inserting this advertisement without authority having been first obtained.

FRED WHITE,
Comptroller N. W. M. Police.
Ottawa, March 20th, 1888.

SUBSCRIBE NOW FOR

THE
Canadian Mining Review
1888.

**INDIAN LANDS**

LANDS IN THE UNDERMENTIONED localities are offered for sale to actual settlers through the following Indian Agents: On the Great Manitoulin Island, Lake Huron, Ontario; Mr. J. G. Phipps, of Manitowaning, is the Agent for the sale of lands in the following Townships on this Island: Assinack, Bidwell, Howland, Shequandah, Billings, Campbell, Carnarvon, Allan, Tehkummah and Sandfield, and in the Townplots of Shequandah, Manitowaning and Shaftsbury (commonly called Little Current). Mr. B. W. Ross of Cockburn Island, is the Agent for the sale of lands on that Island and in the Townships of Gordon, Mills, Burpee and Barrie Island, and in the Townplot of Gore Bay as well as for those in the Townships of Robinson and Dawson, on Manitoulin Island. Leading roads have been constructed throughout the Great Manitoulin Island.

On the Saugeen Peninsula, Ontario, the lands in the Townships Amabel, Albemarle, Keppel, Eastnor, Lindsay and St. Edmunds; as well as several Townplots in the Peninsula, are offered for sale through Mr. William Simpson, Indian Lands Agent at Wiarton, County of Bruce, Ontario.

On the Garden River Reserve, Ontario, Mr. William Van Abbott, of Sault Ste. Marie, is the Agent for the sale of lands within this tract, and which are situated in the Townships of Macdonald, Laird and Meredith; also for lands within the tract commonly known as the Batchewana Bay Indian Reserve, and comprised in the Townships of Awere, Fenwick, Kars, Pennefather, Dennis, Herrick, Fisher, Tilley, VanKoughnet, Tupper and Archibald. There is a leading road through these lands which affords ready communication with other parts of the country to intending settlers.

The condition of sale in respect to the lands within the Townships above described can be ascertained on application to the respective Agents.

(Signed) L. VANKOUGHNET

Deputy Supt. General of Indian Affairs.

Department of Indian Affairs,
Ottawa, February, 1887.



SEALED TENDERS addressed to the undersigned and endorsed "Tender for Post Office, &c., Aylmer, Que.," will be received at this office until Monday, 14th May, 1888, for the several works required in the erection of Post Office at Aylmer, Que.

Specifications and drawings can be seen at the Department of Public Works, Ottawa, and at Ritchie's Hotel, Aylmer, on and after Tuesday, 24th April, and tenders will not be considered unless made on the form supplied and signed with actual signatures of tenderers.

An accepted bank cheque, payable to the order of the Minister of Public Works, equal to five per cent. of amount of tender, must accompany each tender. This cheque will be forfeited if the party declines the contract, or fail to complete the work contracted for, and will be returned in case of non-acceptance of tender.

The Department does not bind itself to accept the lowest or any tender.

By order,
A. GOBEL,
Secretary.

Department of Public Works,
Ottawa, 20th April 1888.



Department of Inland Revenue.

An Act Respecting Agricultural Fertilizers.

The public is hereby notified that the provisions of the Act respecting AGRICULTURAL FERTILIZERS came into force on the 1st of January, 1886 and that all Fertilizers sold thereafter require to be sold subject to the conditions and restrictions therein contained—the main features of which are as follows:

The expression "fertilizer" means and includes all fertilizers which are sold at more than TEN DOLLARS per ton, and which contains ammonia, or its equivalent of nitrogen, or phosphoric acid.

Every manufacturer or importer of fertilizers for sale, shall, in the course of the month of January in each year, and before offering the same fertilizer for sale, transmit to the Minister of Inland Revenue, carriage paid, a sealed glass jar, containing at least two pounds of the fertilizer manufactured or imported by him, with the certificate of analysis of the same, together with an affidavit setting forth that each jar contains a fair average sample of the fertilizer manufactured or imported by him; and such sample shall be preserved by the Minister of Inland Revenue for the purpose of comparison with any sample of fertilizer which is obtained in the course of the twelve months then next ensuing from such manufacturer or importer, or collected under the provisions of the Adulteration Act, or is transmitted to the chief analyst for analysis.

If the fertilizer is put up in packages, every such package intended for sale or distribution within Canada shall have the manufacturer's certificate of analysis placed upon or securely attached to each package by the manufacturer; if the fertilizer is in bags it shall be distinctly stamped or printed upon each bag; if it is in barrels, it shall be either branded, stamped or printed upon the head of each barrel or distinctly printed upon good paper and securely pasted upon the

head of each barrel, or upon a tag securely attached to the head of each barrel; if it is in bulk, the manufacturer's certificate shall be produced and a copy given to each purchaser.

No fertilizer shall be sold or offered or exposed for sale unless a certificate of analysis and sample of the same shall have been transmitted to the Minister of Inland Revenue and the provisions of the foregoing sub-section have been complied with.

Every person who sells or offers or exposes for sale any fertilizer, in respect of which the provisions of this Act have not been complied with—or who permits a certificate of analysis to be attached to any package, bag or barrel of such fertilizer, or to be produced to the inspectors to accompany the bill of inspection of such inspector stating that the fertilizer contains a larger percentage of the constituents mentioned in sub-section No. 11 of the Act than is contained therein—or who sells, offers or exposes for sale any fertilizer purporting to have been inspected, and which does not contain the percentage of constituents mentioned in the next preceding section—or who sells or offers or exposes for sale any fertilizer which does not contain the percentage of constituents mentioned in the manufacturer's certificate accompanying the same, shall be liable in each case to a penalty not exceeding fifty dollars for the first offence, and for each subsequent offence to a penalty not exceeding one hundred dollars. Provided always that deficiency of one per centum of the ammonia, or its equivalent of nitrogen, or of the phosphoric acid, claimed to be contained shall not be considered as evidence of fraudulent intent.

The Act passed in the forty-seventh year of Her Majesty's reign, chaptered thirty-seven and entitled, "An Act to prevent fraud in the manufacture and sale of agricultural fertilizers," is by this Act repealed, except in regard to any offence committed against it or any prosecution or other act commenced and not concluded or completed, and any payment of money due in respect of any provision thereof.

A copy of the Act may be obtained upon application to the Department of Inland Revenue, as well as a copy of a Bulletin which it is proposed to issue in April, 1888, concerning the fertilizers

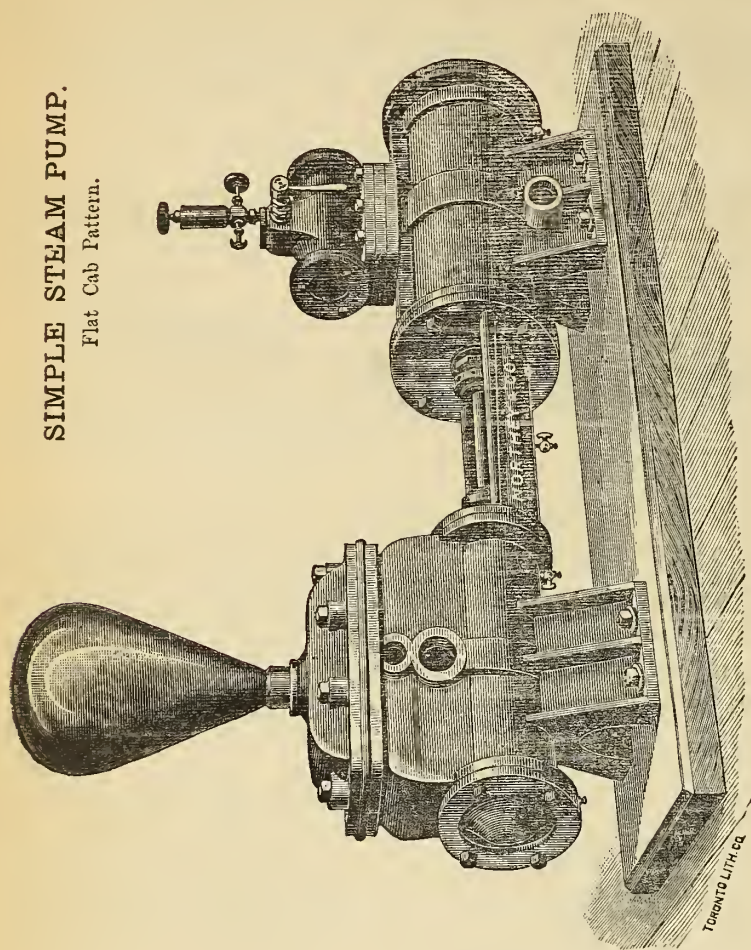
E. MIALL,

15th Dec., 1887.

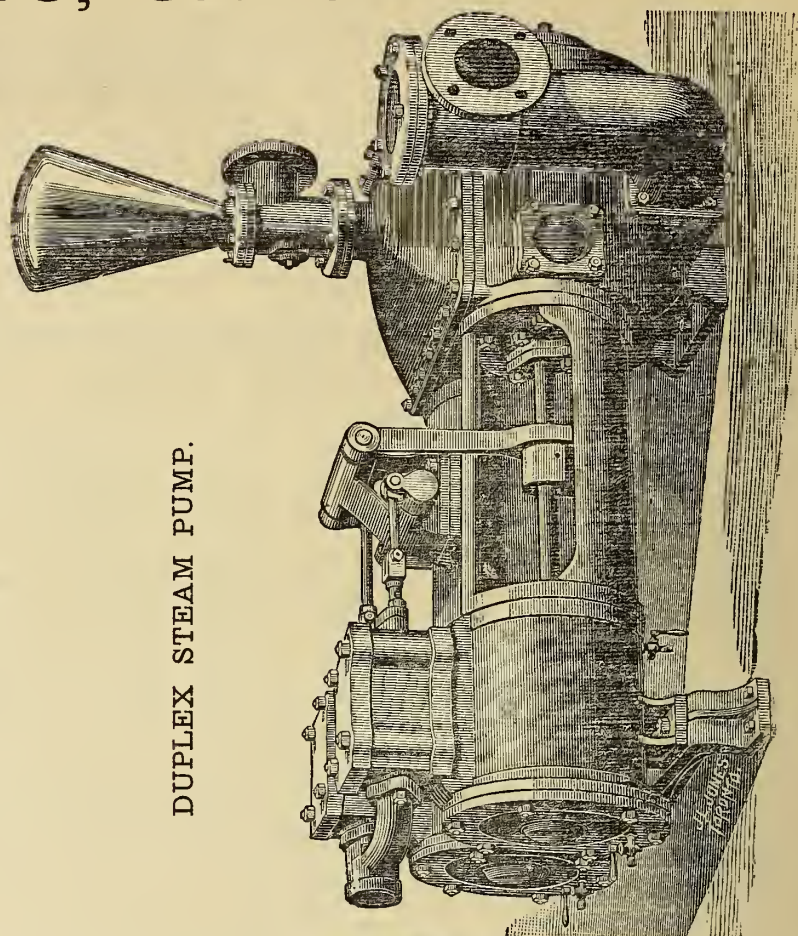
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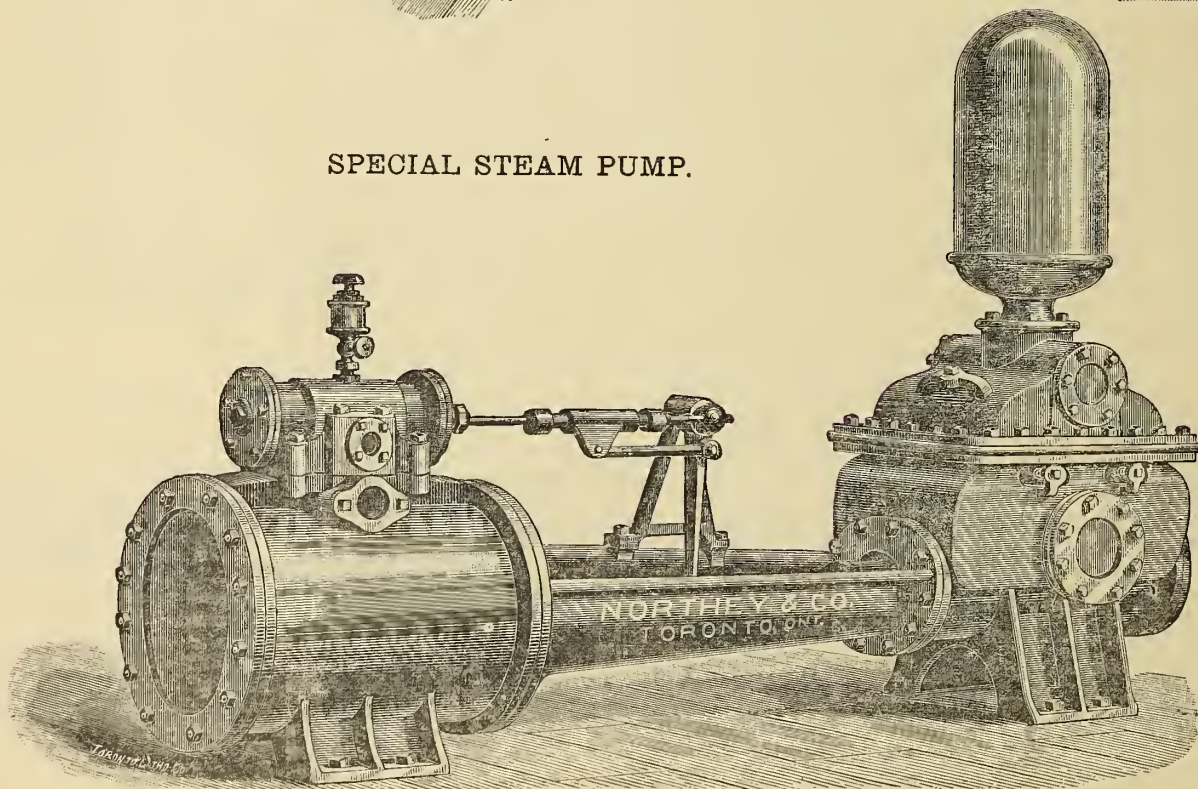
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Mining Regulations

TO GOVERN THE DISPOSAL OF

Mineral Lands other than Coal Lands, 1886.

THESE REGULATIONS shall be applicable to all Dominion Lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, iron or other mineral deposits of economic value, with the exception of coal.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein either by surface or subterranean prospecting for mineral deposits, with a view to obtaining under the Regulations a mining location for the same but no mining location or mining claim shall be granted until the discovery of the vein, lode or deposit of mineral or metal within the limits of the location or claim.

QUARTZ MINING.

A location for mining, except for iron on veins, lodes or ledges of quartz or other rock in place shall not exceed forty acres in area. Its length shall not be more than three times its breadth and its surface boundary shall be four straight lines, the opposite sides of which shall be parallel, except where prior locations would prevent, in which case it may be of such a shape as may be approved of by the Superintendent of Mining.

Any person having discovered a mineral deposit may obtain a mining location therefor, in the manner set forth in the Regulations which provides for the character of the survey and the marks necessary to designate the location on the ground.

When the location has been marked conformably to the requirements of the Regulations, the claimant shall within sixty days thereafter, file with the local agent in the Dominion Land Office for the district in which the location is situated, a declaration or oath setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as aforesaid; and shall, along with such declaration, pay to the said agent an entry fee of FIVE DOLLARS. The agent's receipt for such fee will be the claimant's authority to enter into possession of the location applied for.

At any time before the expiration of FIVE years from the date of his obtaining the agent's receipt it shall be open to the claimant to purchase the location on filing with the local agent proof that he has expended not less than FIVE HUNDRED DOLLARS in actual mining operations on the same; but the claimant is required, before the expiration of each of the five years, to prove that he has performed not less than ONE HUNDRED DOLLARS' worth of labor during the year in the actual development of his claim, and at the same time obtain a renewal of his location receipt, for which he is required to pay a fee of FIVE DOLLARS.

The price to be paid for a mining location shall be at the rate of FIVE DOLLARS PER ACRE, cash, and the sum of FIFTY DOLLARS extra for the survey of the same.

No more than one mining location shall be granted to any individual claimant upon the same lode or vein.

IRON.

The Minister of the Interior may grant a location for the mining of iron, not exceeding 160 acres in area which shall be bounded by north and south and east and west lines astronomically, and its breadth shall equal its length. Provided that should any person making an application purporting to be for the purpose of

mining iron thus obtain, whether in good faith or fraudulently, possession of a valuable mineral deposit other than iron, his right in such deposit shall be restricted to the area prescribed by the Regulations for other minerals, and the rest of the location shall revert to the Crown for such disposition as the Minister may direct.

The regulations also provide for the manner in which land may be acquired for milling purposes reduction works or other works incidental to mining operations.

Locations taken up prior to this date may, until the 1st of August, 1886, be re-marked and re-entered in conformity with the Regulations without payment of new fees in cases where no existing interests would thereby be prejudicially affected.

PLACER MINING.

The Regulations laid down in respect to quartz mining shall be applicable to placer mining as far as they relate to entries, entry fees, assignments, marking of localities, agents' receipts, and generally where they can be applied.

The nature and size of placer mining claims are provided for in the Regulations, including bar, dry, bench creek or hill diggings, and the RIGHTS AND DUTIES OF MINERS are fully set forth.

The Regulations apply also to

BED-ROCK FLUMES, DRAINAGE OF MINES AND DITCHES.

The GENERAL PROVISIONS of the Regulations include the interpretation of expressions used therein; how disputes shall be heard and adjudicated upon; under what circumstances miners shall be entitled to absent themselves from their locations or diggings, etc., etc.

THE SCHEDULE OF MINING REGULATIONS

Contains the forms to be observed in the drawing up of all documents such as:— "Application and affidavit of discoverer of quartz mine." "Receipt for fee paid by applicant for mining location." "Receipt for fee on extension of time for purchase of a mining location." "Patent of a mining location." "Certificate of the assignment of a mining location." "Application for grant for placer mining and affidavit of applicant." "Grant for placer mining." "Certificate of the assignment of a placer mining claim." "Grant to a bed rock flume company." "Grant for drainage." "Grant of right to divert water and construct ditches."

Since the publication, in 1884, of the Mining Regulations to govern the disposal of Dominion Mineral Lands the same have been carefully and thoroughly revised with a view to ensure ample protection to the public interests, and at the same time to encourage the prospector and miner in order that the mineral resources may be made valuable by development.

COPIES OF THE REGULATIONS MAY BE OBTAINED UPON APPLICATION TO THE DEPARTMENT OF THE INTERIOR.

A. M. BURGESS,

Deputy Minister of the Interior.

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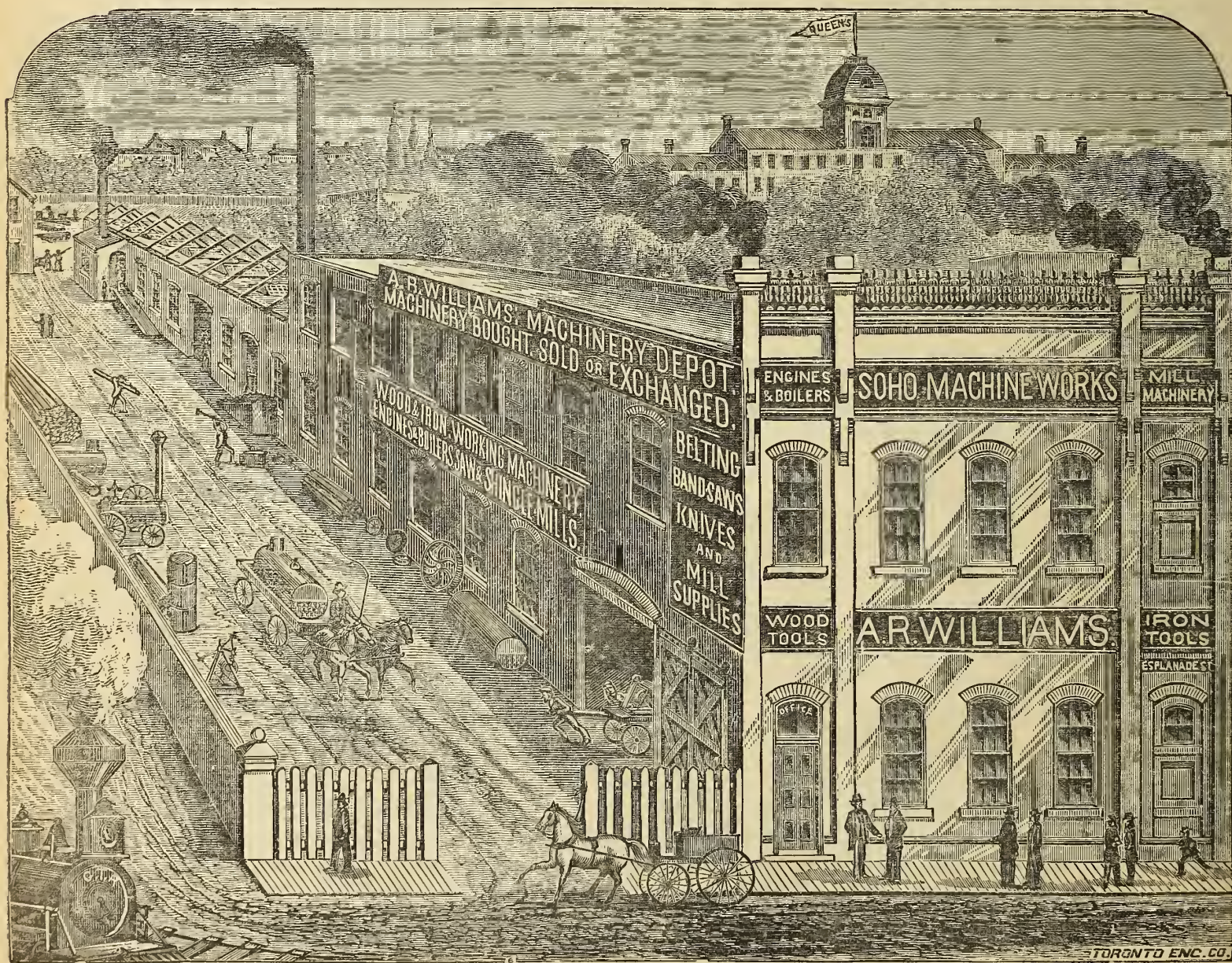
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Established 1882.

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1888.—OTTAWA, MAY—1888.

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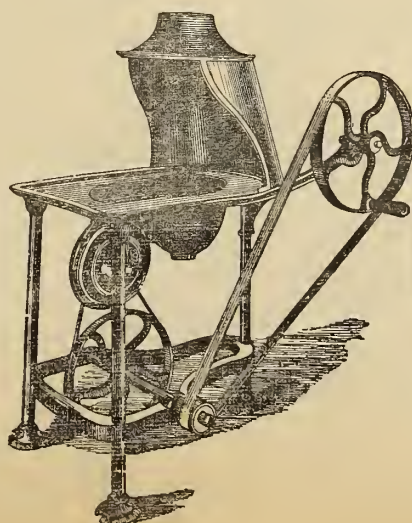
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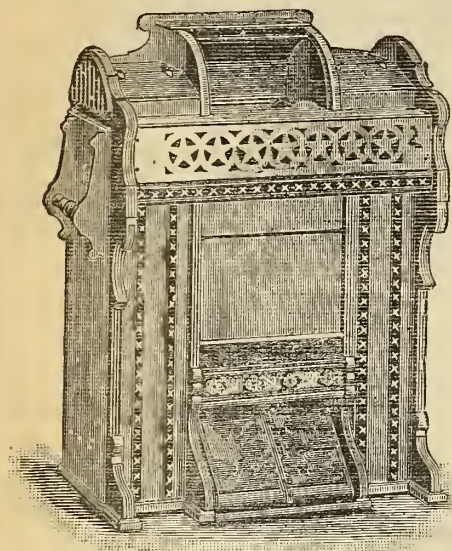
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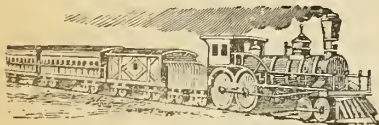
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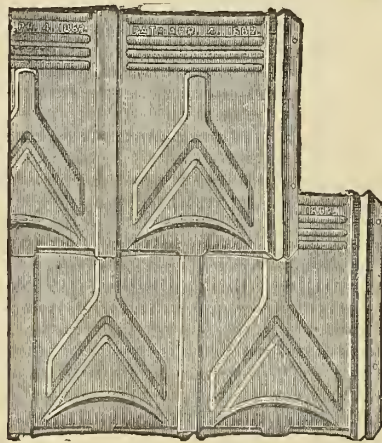
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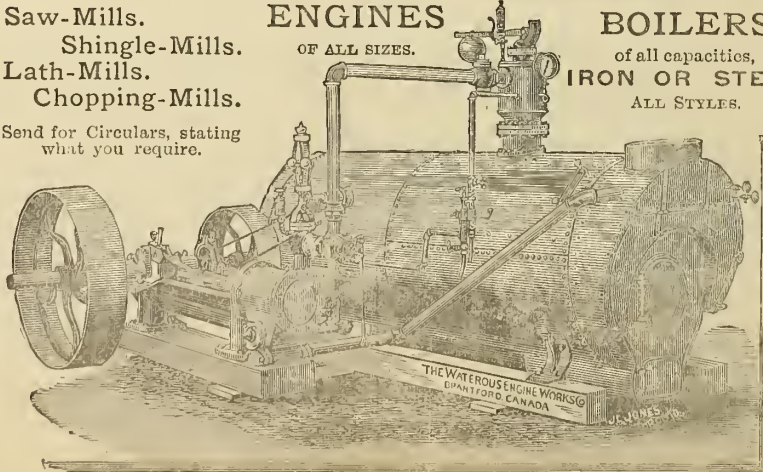
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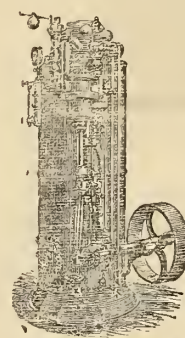
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Vol. VI.

MAY, 1888.

No. 5.

Mineral Production, 1887.

In our article last month it was stated in
error that there had been an increased produc-
tion of iron ore during the year of 6,522 tons of
a value of \$128,424. The figures should have
read:—

1887—76,330 tons of a value of\$146,197
1886—69,708 " " " 126,982

increase of 6,522 " " "\$ 19,215

The mistake occurred, as many of our readers
will have noted, through the transposition of the
figures under the head of "Iron" (e).

Sampling Phosphate.

Some method of drawing accurate samples is
greatly needed in this business. There is some
uncertainty in chemists' analysis, though experi-
ence is rendering their results more uniform
than has been the case. But the selection of a
sample is usually a contest between buyer and
seller as to which can select the most unfair
specimens in either direction. Luck or knowl-
edge frequently enables one party to get the
advantage of several per cent. over the other,
and dealers in phosphate consider that when
sampling time approaches they must prepare
for a contest of wits or a gambling game.
Ashes, which are imported in much smaller
quantities than phosphate, are honoured with a

Government inspector who determines the quality. Some such arrangement must be made to arrive at the value of phosphate before it will be a satisfactory business to either buyer or seller.

The Development of Our Iron Mines.

The import of iron into the United States from Spain during the fiscal year ending 30th June last was 522,719 tons, or nearly one half of the whole quantity of that ore imported. From Canada, i.e. Ontario and British Columbia, there were imported, from the former 18,340 and from the latter province 10,002 tons, or in all 28,342 tons. The Spanish mines are rapidly giving out, and the material question will be with the American iron workers, whence they shall replace the supply. The question, moreover, does not affect the United States alone, but England will have to cast about for a fresh source for her steel supply, and in that enquiry our Canadian hematite will probably be prominently brought forward. This event might result in some of the English firms removing their works here. The Canadian market is too limited and our population is too scattered for a remunerative manufacture of ore at home for our own markets. Michigan and Wisconsin owe a large amount of their prosperity to the iron mining industry they carried on, the market value of the ore in the former State alone being over twenty million dollars last year, the greater part of which was expended amongst miners, and in teaming and shipping the ore. The duty on the ore from Canada alone prevents the same results in our iron producing districts, for we have a larger mineral tract of country than Michigan, and our ores are equally rich if not superior. What Canada requires is blast furnaces, at convenient points, and a central coke furnace, and with these in operation we should have not only employment for thousands of hands, but thousands of dollars would be distributed amongst our people, now denied to them while the duty remains what it is, or rather in other words, for want of reciprocity.

The stupid cry raised in certain quarters—for it is nothing but stupidity to stand in the way of natural trade—that unrestricted reciprocity means political degradation to Canada, is the barrier against the development of our iron deposits. We do not, in taking up mining questions, take either one side or other in politics—that is not our sphere—but we do look to the best interests of the mining community, and our object is to place their interests before them in the true light. The question may be raised by some, how are blast furnaces to be carried on when the transport of coal is taken into account. This can be answered by the simple reply that charcoal can be abundantly manufactured close to almost all, if not at all the deposits of iron ore; and as regards a market under existing laws, take the case of Nova Scotia where iron and coal are contiguous, but where is the market for a large output? Take

off the duty, and Nova Scotia could not smelt fast enough for the demand. The majority of our iron districts in Ontario are within 200 or 300 miles of Buffalo, and even without smelting works the ore could be easily transported there, whilst from Lakes Superior and Michigan there is a distance of 1,000 miles for conveyance, and yet ore is carried thence to various points in Pennsylvania at a remunerative return. We hoped that a previous article in these columns on this subject would have drawn out new ideas from some of our readers, and opened a correspondence on the matter, and we still hope this effect will be produced. If Canada is to look to her minerals as one of her paying resources, and that they are such if they could only be marketed is a self evident fact, our legislators will have to amend the present state of trade relations between Canada and the United States, as far as minerals are concerned, and the result will astonish not only themselves, but the iron market of the world. Throw open the markets to us, and there is nothing to prevent us turning out as much ore as Michigan and Wisconsin, smelting equally with Americans and circulating through this industry alone money to such an extent that prosperity would prevail in districts where now a stray labourer only makes even a precarious living. When the iron trade flourishes there is general prosperity; when it languishes there is stagnation. We advocate in this commodity at least, reciprocity, and we mean to keep this advocacy before our readers.

The Ontario Commission.

The want of a complete report on the mineral resources of Ontario has long been felt, and in response to the general wish, on the 14th of March last a resolution was carried in the Legislative Assembly, on motion of the Hon. C. F. Fraser (acting for the Hon. T. B. Pardee, Commissioner of Crown Lands) authorizing the Government to appoint a Royal Commission to investigate and report on this subject. Acting on this resolution, the Council on the 8th instant appointed the following gentlemen a Commission for the above purpose:—

John Charlton, M. P., Chairman; Robert Bell, B.A.Sc., M.D., LL.D., F.G.S., Assistant Director of the Dominion Geological Survey, Ottawa; Wm. Hamilton Merritt, Mining Engineer, Toronto; William Coe, Proprietor of Iron Mines, Medoc; Archibald Blue, Deputy Minister of Agriculture, Secretary of the Commission.

The Commission has been chosen without reference to politics, and it is universally conceded, both by Liberals and Conservatives, that an excellent selection has been made.

Mr. Charlton has long been favourably known as a public man. His business ability is undoubted, and his great experience and extensive knowledge of public affairs will be of much value to the Commission. In addition to these advantages, Mr. Charlton is a man of affable manners,

courteous, quick at perception, and a good writer.

Professor Bell, a native of Ontario, is the oldest member of the Dominion Geological Corps, having been connected with the staff for upwards of thirty years, a considerable portion of which have been spent in Ontario, and our present knowledge of the geology of this Province is largely due to his labours. His extensive acquaintance with the rocks of the continent in general, will be of great service in the present instance. He has made a special study of the economic minerals of the country, and is well versed in the history and statistics of all the mines which have ever been worked in Ontario. Dr. Bell was Professor of the Natural Sciences in Queen's University for five years, and the experience which he must have gained there in instructing students, and clearing up their difficulties on geological questions, will now prove of service to him in preparing a report which may be easily understood and which, we think, should be as free as possible from technical terms. Full of enthusiasm for Canada, we feel confident that Dr. Bell will strive earnestly to meet the wishes of the people of his native Province in connection with the development of her vast mineral wealth.

Mr. Merritt, another Ontario man, is a mining engineer who has taken much interest in the mines and minerals of the Province. He has already done much good service in calling attention in his writings to the mineral deposits of Canada. He has also for the last year or two collected and published numerous statistics of mining in Ontario. At one time he was engaged in mining gypsum on the Grand River. In connection with the present enquiry, Mr. Merritt will be able to give us an account of what has been done in the development of the minerals of the Province from a mining engineer's standpoint.

Mr. Coe will prove a valuable addition to the Commission in consequence of his knowledge of mining and railway building. He has been more particularly engaged in the iron industry, which should claim the serious attention of the Commission, especially with a view to the smelting of our iron ores and the manufacture of iron and steel under the protection now afforded by the tariff. As a business man of large experience, and from his extensive connections with mining men, he is in a position to do much to promote the objects contemplated by the present enquiry.

Mr. Blue, the Secretary of the Commission, is too well known as the painstaking Secretary of the Ontario Bureau of Industries, and as Deputy Minister of Agriculture, to require any praise at our hands. The accuracy and thoroughness with which he has performed his duties in the past are a sufficient guarantee that his present work will be well done.

The Commissioners met the members of the Government by appointment in Toronto on

Saturday, 12th inst., when it is understood a programme was agreed upon, the particulars of which, however, have not been made public.

We regard the appointment of this Commission as very opportune and a highly important step in the right direction. The action of the Government in the matter has met with universal approval throughout the country. We have no doubt that every facility will be afforded the Commissioners, in their investigations, by the owners of mines and mineral lands, and the publication of their report will be looked forward to with the greatest interest. We presume that it will embrace a sketch of the geology of the Province with special reference to economic minerals, and accounts of the principal mining districts. The Commissioners should also consider any suggestions which may be made with a view to improving the facilities for access to new mineral lands. They will no doubt consult the wants of the mining community in general and endeavour to meet them as far as possible.

Home Use of Phosphate.

The feeling is growing on every hand that it is absurd to be exporting this richest of all fertilizers while our country is full of worn out lands. Farms are constantly being abandoned in Ontario and Quebec, and families emigrate to a life of hardship in a western wilderness for the sake of newer soils, when knowledge of the means of enriching the old lands would preserve their homes in affluence. It is not a lack of the existence of knowledge either that is at fault, for the knowledge has been gained and many communities are profiting by it, but the fault lies in lack of zeal on the part of those who should be the people's instructors, and also in lack of enterprise by commercial men who might spread the education to their own profit. Now that experimental farms are being undertaken in Canada, it is to be hoped that no niggardly policy will prevent the widest distribution of information as to the results obtained. No subsidy or protective tariff can compare for a moment, as a means of benefitting the country, with a system that would promote the production from its lands. An increase in the fertility of the soil would add to the wealth of the country more than any conceivable number of manufacturing industries could do, and this result would be secured without robbery or injustice to any unprotected interest.

Georgia has been admitted to possess the poorest soil of any of the Southern States, and twenty years ago its worn out lands could be bought for \$3 per acre. But knowledge of fertilizing has been extended and these same lands now command a market value of \$30 per acre, and the State now leads the South in the quantity and quality of its farm products, its cotton equalling that produced on the famous Red River bottoms of Louisiana. The same improvement could occur in the Province of Quebec.

The agricultural editor of the Boston Post

says: "To incorporate daily a certain amount of fine ground phosphate of lime into the fresh barnyard manure, by scattering it over the manure pile, or to compost them for some months previous to their designed application is a universally endorsed practice. The good economy of applying these phosphates in a finely divided state to the compost heap has been illustrated again quite recently by Prof. H. C. White, of Georgia." This gentleman put finely ground Carolina phosphate into a compost heap and after about half a year "a careful estimation proved that one-third of the phosphoric acid had been rendered insoluble in soil water. The commercial value of the phosphoric acid had been increased not less than 46.4 per cent."

Many United States farmers now keep finely ground phosphate constantly on hand, and daily spread it in the stables and stalls to absorb the urinary excretions and become mixed with the manure. A most valuable fertilizer is thus secured at small expense. Here is this natural fertilizer placed by nature at our doors, and we are not sufficiently intelligent or enterprising to make use of it. A great opportunity exists in this direction for both the philanthropist and the capitalist to work, and secure the blessing due to him "who makes two blades of grass grow where only one grew before." The Department of Agriculture and the Agricultural Societies should spread information about commercial fertilizers, and some wide-awake men should seize the opportunity to prepare and sell them in Canada.

This is a most important matter for our miners, as well as for our farmers, and we are fully justified in calling attention to it in these columns. Every pound of phosphate that can be mixed in Canada is needed on her own soil, and should be sold here instead of being transported thousands of miles and often sacrificed in competition with inferior foreign products, or through losses by those "tricks of trade" that are so notable a feature of modern commerce.

Mineral Development Company.

We have received the prospectus of a newly formed enterprise, under the title of "The Mineral Development Company of Ontario," (limited), with a capital of \$200,000 in 40,000 shares of \$5 each, with its headquarters in Toronto. According to its prospectus, the objects of the company are not to operate in mining, in the proper sense of the word, but to explore and develop to a marketable point mining locations in Canada, and to place them for sale. It is considered, and justly we think, that a company will be in a far better position to do this, than individuals. There are frequent instances of parties owning land in which there is every reason to believe, from analogy, that mineral deposits exist, but who have not the means to explore, nor the knowledge that would direct them where to look, or,

even if they did find indications, who might not be in a position to develop such indications, and to ascertain the value. Such parties have been known to sell their mining rights for a mere bagatelle compared with the real value of the output obtained by the purchaser, and when too late regret their inability to have explored further and developed what indications they knew of. At a juncture like this, such a company as the above steps in, and on very reasonable terms undertakes to ascertain the value of the lands, and to find a purchaser, thus limiting any possible loss, and greatly increasing the prospect of gain. With the names of such men as H. S. Howland, Sandford Fleming, and T. C. Keefer as directors, amongst other well known men of standing, the character of the Mineral Development Company of Ontario may be considered as no "wildcat" scheme. Its Secretary is Mr. Alex. Rankin, 20 Toronto Street, Toronto.

Algoma Indian Lands.

Our readers will be interested to learn that the last official act performed by the late lamented Hon. Thomas White was in the interests and for the benefit of the mining community. The new mining regulations for the disposal of Indian lands in Algoma, issued by the Department of Indian Affairs, were thought in some particulars to be prejudicial to the speedy development of the mineral resources of that district and with a view to their adjustment a deputation from Sault Ste. Marie waited upon the Superintendent-General of Indian Affairs.

At his last meeting of the Privy Council—held on the Saturday when he first took ill,—Mr. White brought the matter up, and on his recommendation the laws were amended as follows:—

1. That section 3 be amended by fixing the area of a mining location at 160 acres instead of 40 acres as therein stated.

2. That section 7 be amended by providing that in cases where the survey is not made by the purchaser, the deposit for a survey of a location be \$100 instead of \$50 as therein stated.

3. That sections 81 and 82, reserving a Royalty to the Crown of four per cent. on the sales of the products of mines, and requiring returns by the grantee of all products of his mining location, be annulled.

4. That form "D" of said Regulations be amended by striking out the provision therein respecting the payment of Royalty.

5. That the price of land shall be three dollars per acre.

6. That the 5th clause of the said Regulations be rescinded, but that the right to purchase a location shall be limited to twelve months from the date of obtaining the agent's receipt, as provided in sub-section "C" of section four.

SITUATION WANTED as Foreman Engineer at Mines. Sixteen years experience erecting, repairing and running Hoisting, Pumping and Air Compressing Engines and machinery. Would undertake, in connection with above, the duty of Time and Store-keeper or Outside Overman. References if required. Address "Engineer," office of THE CANADIAN MINING REVIEW.

The Prospector's Soliloquy.

"To dig, or not to dig, that is the question ;
Whether 'tis wiser in the deed to follow
The lodes and bearings of aniferous metal ;
Or to keep watch upon the claims of others,
And, by attention, jump them ?—To sink,—to blast,—
No more ;—and, by a shot, bring forth to light
Gold, pure gold, and the hundred usual signs
That indicate it,—'tis a consummation
Devoutly to be wished. To sink,—to blast :—
To blast ! perchance to burst ; ay, there's the rub ;
For dynamite speaks truth, and barren quartz,
When fused has run its length, stands forth in all
Its nakedness. There's the delay
Of new machinery, the cost of it,
No water power, wood too dear for steam,
The assayer's test, a partner's contumely,
Nor signs of proffered help, the road to clear,
The insolence of office, and the sneers
Which drive a man to think of seeking death
At the drill-hole's mouth, and quit the world, hoist
On his own petard. Who loves backwoods life,
To grub and rough it with weary thoughts of home,
But that the chance of something turning up,—
The unexpected nugget, to grasp which
All prospectors strive,—captures the fancy ;
And reconciles us to discomfort now,
To reap rewards when we are old and grey ?
Buoyed up by hope, both hearts and nerves are steel'd ;
And thus, that he who seeks shall surely find,
Brings to our minds both joy and sweet content ;
And mighty works of great scope and daring,
This end in view, are carried out in fact,
Not dreamt of all day long."

LETTERS TO THE EDITOR.

We invite Correspondence upon matters consistent with the character of the REVIEW.

Be as brief as possible. The writers name in all cases required as a proof of good faith.

One dozen copies of the issue containing his communication will be mailed free to any correspondent on request.

We do not hold ourselves in any way responsible for the opinions expressed in this section of the REVIEW.

Asbestos Output—1887.

MONTREAL, April 27, 1888.

The Editor

THE CANADIAN MINING REVIEW :

SIR,—We note per your April issue received to-day, that you give the output of the Anglo-Canadian Asbestos Co.'s mine for 1887, as 340 tons only.

This is an error. The actual output to 29th October, when we closed down for the winter, was about 540 tons, and 100 tons additional were taken out during the 12 months ending that date.

We also note that you make no mention of Mr. Jeffery's mine at Danville, the product of which must have been at least 400 tons.

We are, etc.,

IRWIN, HOPPER & CO.

Iron Smelting in Ontario.

TORONTO, 17th May, 1888.

The Editor

THE CANADIAN MINING REVIEW :

"There is a tide in the affairs of men, which taken at the flood, leads on to fortune."

SIR,—The above quotation seems peculiarly applicable to the iron industries of Canada at the present time. Our mines are being so developed that we can speak with certainty about the supply of ore ; we can get fuel for coke furnaces from the States at a cheap rate, or from Nova Scotia at a rate which, if not cheap as regards the furnace-man's idea, still allows a moderate profit on the manufacture of iron.

The iron consumers throughout the country are suffering under the imposition of an enormous duty, which has been imposed with the view of forcing the establishment of blast furnaces in Ontario especially, or else of nursing the Nova Scotia industry at our expense, the freight from Nova Scotia to Toronto being at the same time as bad as a special tariff operating against the interests of the Ontario manufacturer. It has come to this—we must seize the opportunity to start furnace work in Ontario and so give our manufacturers cheap iron ; or the tariff must be at once removed. When I say we must seize the opportunity, I do not mean that a furnace could not be run if the existing duties were taken off, but the manufacturers accustomed to the use of Summerlee, Langloan, Salisbury and various other brands of English, Scotch and American irons would not take the trouble to give Canadian iron a fair test if they could get the others just as cheap. Under existing circumstances we can give them Canadian iron \$2.50 to \$3.00 cheaper than foreign iron, and they will gladly try it and do their best to make it answer the purpose ; meanwhile the furnace manager getting a more thorough knowledge of their needs, will work to meet them, so that very soon it will be a matter of indifference to all parties whether the duties are removed or not, because the furnaces in Ontario can afford, once they get in good running shape and understand the mixture of ores needed, to under sell the American furnaces. One difficulty, however, exists, and it rests with the owners of the Canadian iron mines to remove it ; that is, they must show their willingness to dispose of their ore, or of their mines, if they will not mine the ore themselves, at a fair and reasonable rate. Their motto should be "live and let live," but if they want everything and choose to play a stubborn part in this matter it is useless to do anything in the blast furnace line. I knew a man some eight years ago for whom I tried to sell an undeveloped iron mine. I had a purchaser for it, but as soon as the owner saw a chance to sell (what might, for all he could tell, have been a worthless property) he at once asked \$20,000 cash for it. That ended the transaction. If this sort of spirit still actuates Canadian mine owners, Ontario will never make a pound of iron "until" (as an old friend of mine remarked in connection with the above transaction) "there have been a few first-class funerals in the country."

Yours obligedly,

SAMUEL D. MILLS.

The Profits of Asbestos Mining.

THETFORD, QUE., May 15, 1888.

The Editor

THE CANADIAN MINING REVIEW :

SIR,—I note in your valuable issue for April a quotation from an exchange stating that the exorbitant prices asked for mining locations, and the uncertain nature of the veins of the mineral, are two inherent evils which prevent the industry from being so profitable as it would at first sight appear. As a statement of this kind may be misleading, will you kindly allow me space in your columns to give a few facts in connection with this most important and rapidly increasing branch of our mining industry.

Proprietors of asbestos lands are offering their locations at reasonable prices and conditions. Lands in this district can be purchased at from twenty to fifty thousand dollars, which will yield on an average from 250 to 300 tons of ore per annum (according to the size of the location), for at least twenty-five years. The

cost of mining and preparing the mineral for the market may be fairly stated at \$25 per ton, and as at present the demand is very much greater than the supply, especially for the first quality, which commands from \$80 to \$100, the simplest calculation will show what a capital investment there is for the miner. Other owners are working them at royalties of from \$6.00 to \$8.00 per ton, and here the miner, who only pays for what he takes out, runs little or no risk.

It is the promoters, brokers and middlemen who ask for exorbitant prices and act detrimental to the best interests of the industry. They do not invest a dollar. They get properties bonded to them at reasonable figures, and ask *twice*, often *four* times as much as they have the property bonded for. The immense profit these parties make, no doubt causes the "outlay of capital which seriously cripples the resources of a company," but such profits can not be charged to legitimate mining.

I have been grieved to see many desirable investors victimized by these middlemen, who have not only sold them mining locations at absurdly high prices, but have spent thousands of dollars of their money in ill-adapted and impracticable workings, and on useless and expensive machinery, for which they in their capacity as agents receive large commissions from the manufacturer.

These men are the curse of any mining community, and investors would do well to give them a wide berth and deal with principals only. Extravagant and inexperienced management, large salaries, grand houses, and surface workings which produce *no ore*, would ruin the best mining property in the world.

On the other hand, companies which have gone carefully and economically to work have for years past, and are now, making over 100 per cent. clear profit on their investment, and these mines are improving and look better every day. There is little room to fear of the exhaustion of the surface deposits by quarrying for many years to come. The asbestos bearing hills rise for many hundred feet above the level of the present workings, and extend, as far as yet known, for a distance of ten miles over a district from the Thetford mines, south to beyond the Coleraine or Black Lake mines, affording ample ground for development for many years to come. (See Reports Geological Survey, 1885-6; also Crown Lands Department, Province Quebec, with accompanying maps of the Serpentine formation.)

I can say very little yet about underground mining. Any expert can easily see, by walking along the open cuts, that the richest ground is below his feet, and if he makes enquiry he will be told that in this neighbourhood the various companies contemplate bringing deeper cuts from lower levels to the place of the present workings, for they are certain it will pay to do so. The Boston Asbestos Company have, during the past winter, sunk a shaft on one of their open cuts, which has proved very profitable, yielding ore in quality and quantity superior to any yet found in the quarries. This was done with a view to test the ground in depth, and give employment to the miners during the winter, as work can not easily be carried on during the inclement season. The result of this experiment has proved so satisfactory that all the others declare that they will sink shafts next winter, so that asbestos mining will soon be carried on all the year round.

So regular are the profits of the Thetford mines, and so bright are their prospects that to-day I am certain they could not be bought for

less than a million dollars.

I am, etc.,
"ASBESTOS."

[In estimating the value of asbestos lands the quality of the output from the various mines must be considered. For instance, if we compare Thetford with Black Lake, we find that in the former a very large percentage of ore ranks as first-class, with a small percentage of second-class only, while at Black Lake, on the other hand, the bulk of the ore is seconds and thirds with a comparatively small percentage of firsts. The market value of these may be fairly stated as: 1st, from \$80 to \$100; 2nd, from \$40 to \$50; 3rd, from \$10 to \$15 or \$20. It is gratifying to observe that the percentage improves as the quarries increase in depth and the rock becomes more solid.—EDIT.]

The Canadian Phosphate Co. (Ld.)

The statutory meeting of the Canadian Phosphate Company, Limited, was held at the Cannon Street Hotel, London, on 12th ult., Mr. Edward Packard (the chairman) presiding.

The Chairman said: This meeting is convened in accordance with our articles of association, and is what is called the statutory meeting; I believe the object of it is to give the shareholders an opportunity of meeting their directors. I am glad to inform you, gentlemen, if you are not acquainted with it, that the company has been successfully and fairly floated; that the whole of the share capital is subscribed for, and I believe we are in thorough going order. The property has been taken over by the company, the titles have been duly investigated and found to be in proper order, and the property has been transferred to the company. When the directors first took over the management of this business, we felt it incumbent upon us to make ourselves thoroughly acquainted with it in every respect, and with its possible requirements. In accordance with that idea, one of our directors, Mr. Millar, kindly undertook in a somewhat inclement season to make a journey to Canada, with a view to visiting the mines. With some 10 ft. of snow at the mines this might have been thought a useless journey; but it will require very few words from me to show that it was by no means so, because by his taking it we shall be able to adopt measures which will develop the property much earlier than we could otherwise have done. The expense incurred was not a heavy one, and I feel sure the shareholders will join with me in thanking Mr. Millar for his exertions on that occasion. (Hear, hear.) The thermometer at the time registered 25 degrees below zero, so you will appreciate the physical disabilities under which he laboured. Of course, it was necessary that the output of the mine should be, as far as possible, increased, and with that view we have taken steps which will, we believe, ensure a considerable increase in the output from the mines over and above what would have been possible had we not taken those steps at that juncture. Had we waited till the snow cleared away it would have been almost impossible to have placed the large quantity of machinery in position till the snow came again next year. Mr. Millar will be able to answer any questions so far as relates to what he saw at the mines. The reports received from the mines are as satisfactory as could be expected under the circumstances. The whole prospect of the company is extremely favourable, and there is no reason, in any shape or form, to think but what the success of the company will in the end be considerable. (Applause.) I believe the principal object of the meeting to-day

from a business point of view is to appoint an auditor. I am not aware of any other important business there is to bring before you, but we are here to answer any questions that the shareholders may desire to put to us. (Applause.)

Mr. C. C. Hoyer Millar: I shall be very happy to make a short report on the result of my journey. In accordance with the wishes of your board of directors, I left England on January 7, reaching New York on the 16th, where I called upon Mr. Williams, the president of the Union Phosphate Company, from whom your property was acquired, and who is a director of the present company. I conferred with him at great length as to the future conduct of the mines and the business of the company. From New York I proceeded to Montreal, and during my stay there made arrangements with the Canadian Pacific Railway for the more economic handling of the output from the mines. From Montreal I travelled by rail to Buckingham, driving the remainder of the distance in a sleigh up the River du Lièvre to your property. As almost the entire output of phosphate up to date has been obtained from the Star Hill Mine, I will first describe to you what has been done there. The principal work consists of two large pits, called the Big Pit and the Bridge Pit. These two are situated within 150 ft. of each other, and are working on the same lead of phosphate. The Big Pit is about 90 ft. deep, 50 ft. wide and 70 ft. long, and is crossed by a very good deposit of phosphate, and though from time to time, as the work proceeds, the amount of phosphate actually in sight at one time varies very much, I may say that the pit is looking far better than it did when I visited the mines during the summer of 1885. Hitherto the excavating has been pure quarrying, but drifting is now being done on both sides of this pit, and I hope that all the work here will very soon be under shelter, which will not only mean an economy in working expenses, owing to the fact that less dead rock will have to be moved, but will also make a most material difference in the work done during the winter months, at which time the frost and snow prove a great hindrance. The Bridge Pit is, at the moment, not being worked, but on the disappearance of the snow mining will be resumed here, and in several smaller pits, which are let alone during the winter owing to the expense and difficulty of keeping them free from snow. The Dugway and Ruby Mines are practically untouched, though the prospecting pits show good deposits of phosphate. In the spring attention will be turned to this portion of your property. On the Williams Mine work was only begun last spring; but the two pits (Parquets and Lapoints) are both doing well and producing phosphate steadily. This mine is pronounced by the experts to be the most valuable part of the property, and your company is now turning its particular attention in this direction. Since possession was taken a new barn and stables, sleeping-house for 100 men, boarding and cook houses have been built, and at the present moment a very large cobbing-house for dressing the ore (which will be the largest and most complete on any phosphate mine in Canada) is in course of construction, and will shortly be finished. We have also made arrangements for building a tram-road for the transport of the ore to the river, as the inequalities of the ground render summer haulage impossible. From the steep slope of the hill where the sinking is going on, the ore can be economically handled and the native rock got rid of, and in the spring the scope of operations at this point will be greatly increased. . . It may here be mentioned

that the phosphate runs in a series of pockets connected by small strings or leads of ore, and the cost of production varies in accordance with the size of these pockets. By working in several places at one time the cost of production per ton in the various pits is about equalised. Cost of transport from pit's mouth to ship's deck in Montreal is 11s. per ton. Turning now from the phosphate to the management of the mines, I have much pleasure in saying that your company has secured the services of Captain J. E. Smith, who has been associated with the management since the mine was actually commenced. Captain Smith is above everything the most practical and economic manager that could be wished for, having previously worked for many years in the great mining centres of the United States. He is a large shareholder in the company, and has its interests well to heart, so that you may feel thorough confidence in him. In conclusion I would state that in the opinion of those best qualified to judge, you are the possessors of a most valuable property, of which but a very small portion has yet been touched, and it is beyond the possibility of doubt that as the huge cornfields of Western Canada and the United States get their richness exhausted they will require replenishing with chemical manures, which in turn will cause a great increase in the demand for Canadian phosphate, which is a trade admittedly in its infancy, and one whose expansion is certain. (Applause.)

Mr. Wingfield asked what were the shipments in 1887 that yielded, as stated in the prospectus, 84 per cent. on analysis.

The Chairman said he had personally examined the analysis, and could answer that it was correct. It might be interesting to a competing company to know the shipments, but he could hardly give the information.

In reply to another shareholder, the Chairman said that the output for the week ending March 17 was 60 tons, and for the following week 64 tons; and they were continuing to make satisfactory progress.

A Shareholder: What steps have been taken to secure a Stock Exchange quotation?

The Chairman: We have not actually taken the steps necessary at present, but they will be taken forthwith. (Hear, Hear.)

Mr. Barriston then moved that Messrs. Hibbard, Bull & Co., of 17 King's Arms-yard, Chartered Accountants, be appointed auditors of the company at a remuneration of 20 guineas for the first year.

A Shareholder seconded the resolution.

Mr. Wingfield proposed Mr. Griffiths, of the firm of Deloitte, Dever, Griffiths & Co., but the amendment was not seconded, and the original resolution was put and carried.

The Chairman said that that concluded the business. They had done their best so far, and would continue to do their best for the interests of the shareholders, and he had no doubt that they would be able at their first annual meeting to declare at any rate some dividend to the shareholders.

A vote of thanks to the Chairman closed the meeting.

A Large Lump of Coal.—One of the largest lumps of coal ever mined in the Monongahela Valley was taken from J. S. Neel's Cincinnati mines, near Monongahela City, lately. The block measured 7 feet 8 inches long, 3 feet 5 inches high, and 3 feet 7 inches wide. A temporary track was laid to the river, and the big piece of coal loaded in a boat for Cincinnati.

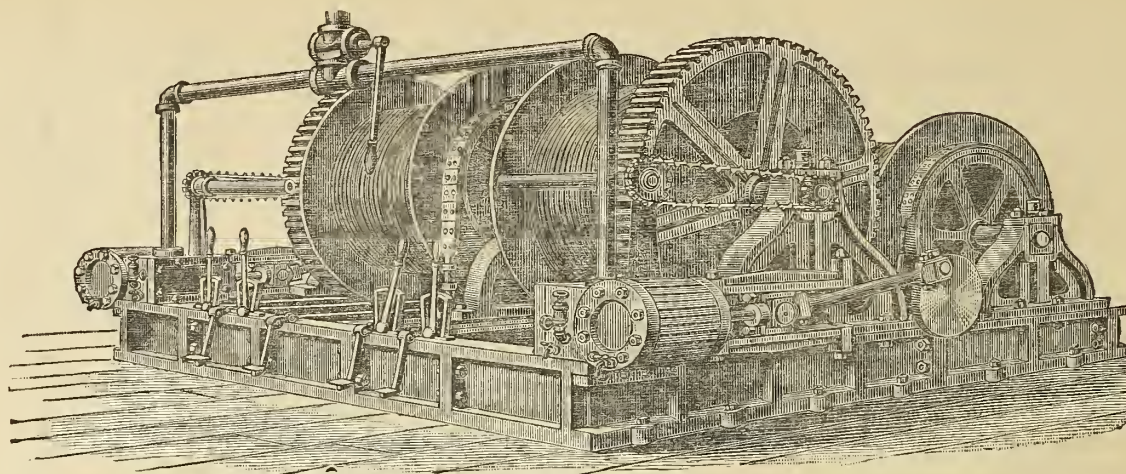


FIG. 40a.—Double Four-drum Hauling Engine.

Wire Rope Haulage and its Application to Mining.

By Frank C. Roberts, C.E., Philadelphia, Pa.

Continued from April Issue.

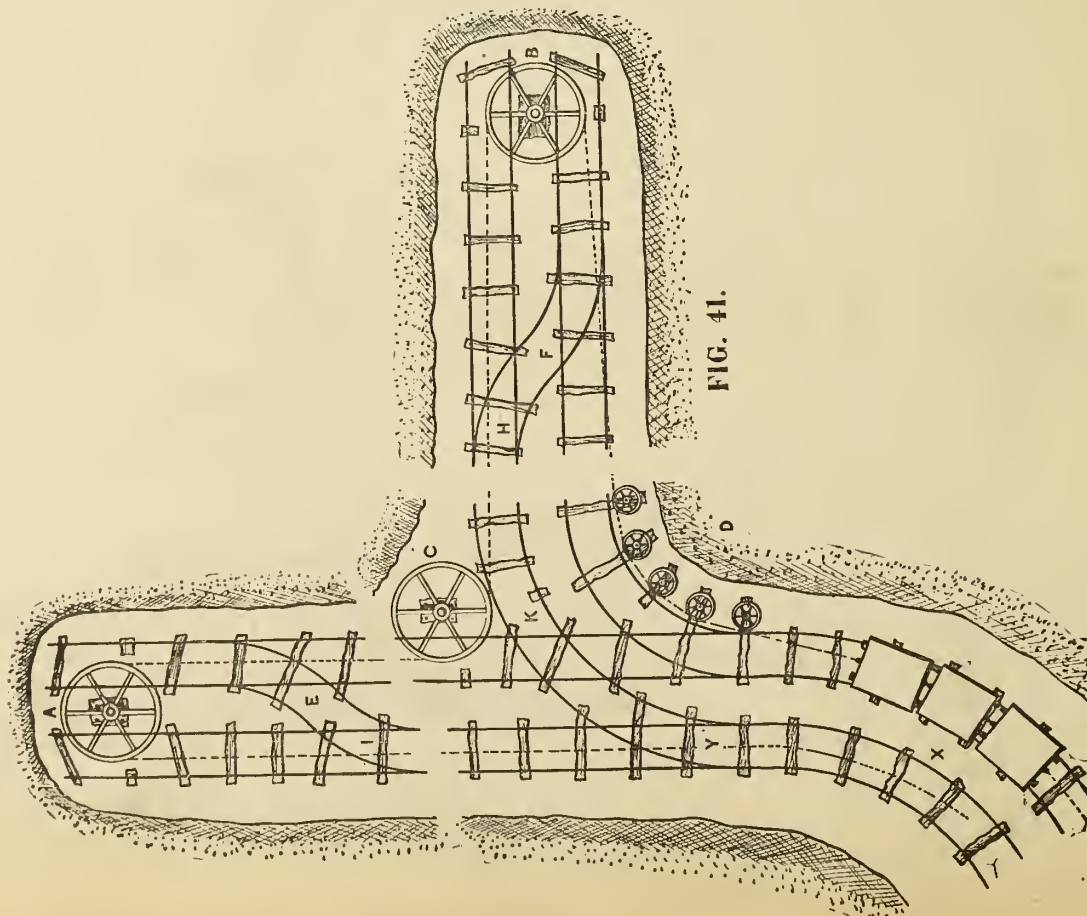
In this system it is of course necessary that the rope be kept taut, and for this purpose artificial tension is introduced. This is usually obtained by passing the rope round a wheel and supporting the latter upon a carriage to which is attached a weight, hanging over a pulley by a chain or rope. Fig. 42 illustrates this arrangement. The rope varies somewhat in length on account of changes of temperature and elongation due to working under tension, and this device permits such variations without detriment to the tractive force or to the rope. An addi-

tional tension device is usually applied to the engine-drums, as will be shown hereafter.

Much time and ingenuity have been employed in devising convenient grips for attaching cars to the moving rope, but those which have been found the most serviceable in mining operations are of the simplest character and among the first employed. Fig. 43 illustrates a grip which may be employed when it is desirable to start and stop the cars without interrupting the motion of the rope. Two levers, B and C, acting on a pivot, K, with jaws, D, for gripping the rope, are actuated by the link A. In order that the grip may pass over the supporting rollers, it is necessary that the rope, when gripped, be elevated above the rollers. To this end, the U-strap, F G, is attached to the bumper of the car, and the grip-levers, B and C, are provided with

lugs H. A chain E forms the link between the grip and the car, by means of which motion is transmitted to the car. In the illustration I have supposed the grip in its lowest position, about to seize the rope. The operator, standing on the bumper at the front of the car, now presses the lever A and closes the jaws D. The rope, moving in the direction of the arrow, carries the grip with it until the chain E is taut. By this horizontal motion of the grip the lugs H, resting and moving on F, are raised to the level of G, and the grip and rope are likewise elevated. In this manner the supporting pulleys may be passed without difficulty.

Where starting is performed at stated points the following device may be employed. A grip similar to the foregoing is fixed by a bolt at K to the bumper of the car. The jaws are about



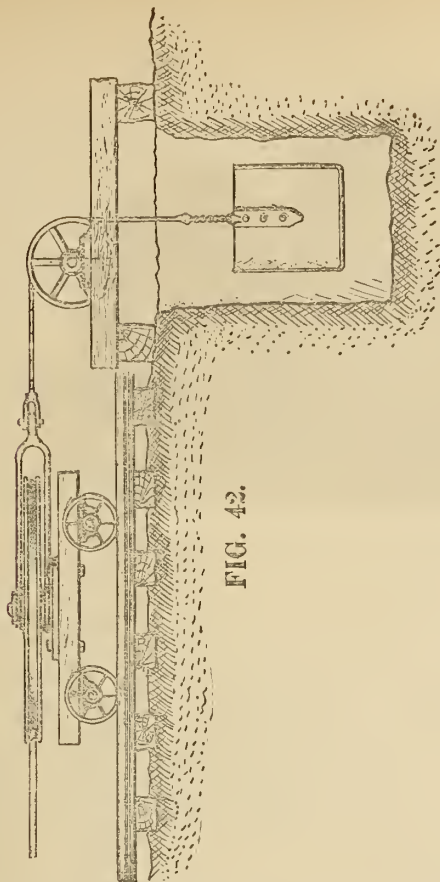


FIG. 42.

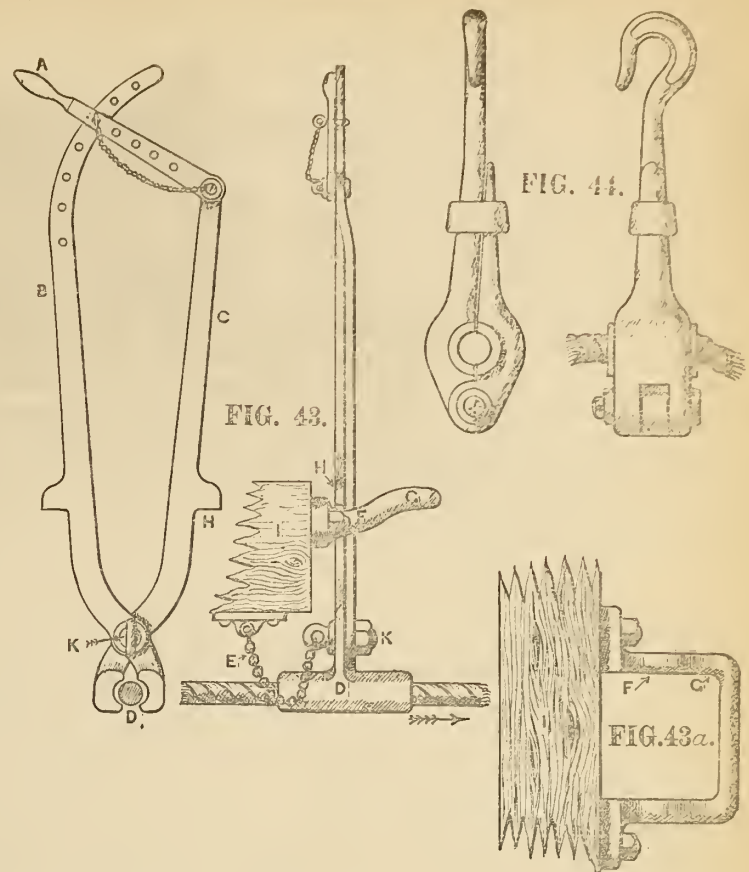


FIG. 43.

FIG. 44.

FIG. 43a.

$1\frac{1}{2}$ inches above the level of the rope when resting on the supporting rollers. In order to enable the grip to clasp the rope when starting a train, counterweighted supporting rollers are placed at convenient points. These pulleys raise the rope at the desired points to the level of the grip, and their vertical motion permits the passage of the grip without difficulty. Referring to Fig. 41 it will be seen necessary to introduce these pulleys at points H and Y. In many mines it has been found more convenient to adopt such arrangements that the rope is stopped for attaching and detaching. For this

purpose I would recommend the device illustrated in Fig. 44.

When there are no side-entries to be operated it will be found convenient to employ a grip-car or "dilly." The most approved form of this device is that used at the Imperial Mine in the Monongahela region. This consists of two vertical double-grooved drums, mounted on a truck running on the mine-tracks. The hauling-rope is brought under the dilly and passed over the forward drum and half-way round the rear one. This is repeated and the rope then continues to the terminus. The motion of the drums is

governed by friction-bands. When the dilly is stationary the drums revolve freely, but when it becomes necessary to impart motion to the dilly the friction bands are tightened, and, coupling being made to the cars, the train is drawn out. Supporting rollers are placed in this system about 20 feet apart, and are usually 6 inches in diameter and from 12 to 18 inches long. When the single-track system is employed, the rollers supporting the loose rope are of the same diameter, but from 6 to 12 inches in length.

Fig. 45 illustrates what I consider the most approved design for an endless-rope hauling-

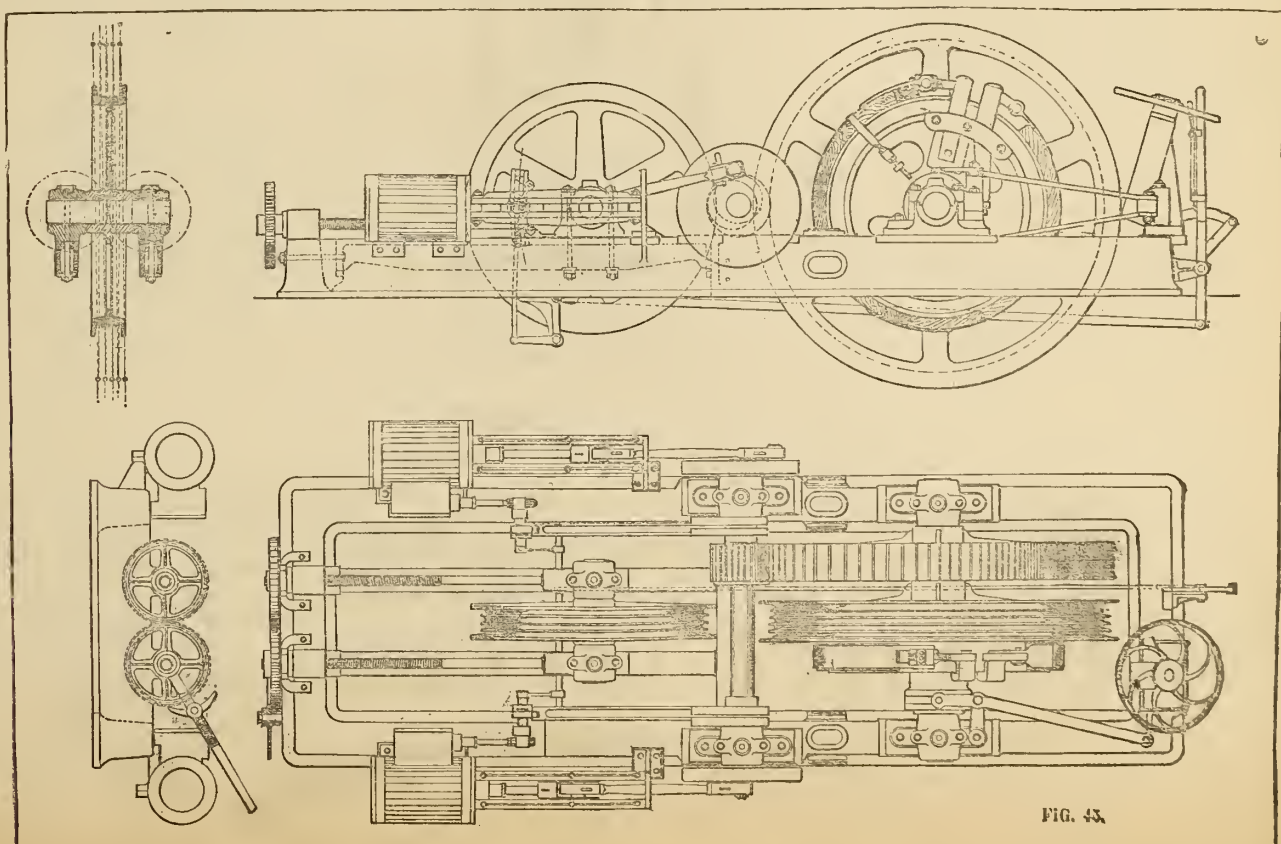


FIG. 45.

ngine. It will be seen that there are here two drums placed tandem. The rope is first passed over the larger and then over the smaller drum. Many times as may be found requisite to secure the necessary tractive force. The motion of the larger or hauling drum is controlled by a friction-clutch. The motive power is furnished by two engines, actuating a pinion meshing with a spur-wheel keyed to the drum-shaft. The "idle" drum rests on sliding bearings, and slack rope may be taken up by drawbolts as shown.

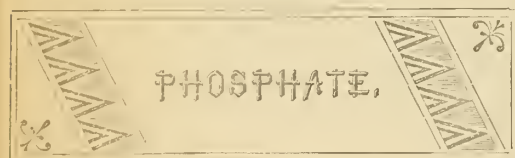
In proportioning the size of wire-rope requisite for a haulage plant, the factors mentioned under the head of hoists and inclined planes must be taken into consideration in this connection also. In the tail-and-counter-rope systems, the stress upon the rope is direct, and is due simply to weight and friction. In the endless-rope system, however, we have another factor to consider, namely, the amount of artificial tension introduced to prevent the slipping of the rope upon the drums. The tension depends, of course, upon the number of times the rope is passed over the hauling drum. In the case of the machine illustrated, where the rope has four half-wrap-pings around the drum, it is necessary to allow 20 per cent. more stress in the rope than in the case of the counter-or-tail-rope system.

Much surface-wear is encountered in this application of wire-rope; and for this reason it is advisable in all cases to employ the best steel wire rope, composed of six strands of seven wires each laid about a hempen center. The table on page 36 gives the various data concerning this class of rope.

CONCLUSION.

In designing a wire-rope plant of any description, it is necessary, in order to obtain economical results, to proportion the details of the system in accordance with results derived from theoretical calculations. The engine-power, the sizes of ropes, drums, supporting rollers and curve-sheaves, as well as the position of the latter with reference to each other and the line of the road, should all be based upon direct calculation. The scope of the present paper does not permit a discussion of the mathematical principles involved; but it may be declared that observation and experience have in every case supported these theoretical investigations.

Wire-rope has taken, by its own merits, a very important part in the development of the mining resources of the United States; and it is to be hoped that the few pages here submitted may contribute something towards a still further advance in the direction of economical mining operations.



In General.

The lawsuit of Alexander Fraser, of Westminster, vs. the Department of Public Works of Canada was heard before His Honour Judge Burbridge in the Exchequer Court on the 12th ult. Fraser owns some 19½ acres of phosphate lands on the north half of Lot 8, 1st Range of Portland East, and claims from the Government the sum of \$10,000 expropriation for his phosphate property, which adjoins, and has been partly taken up by the Government for the construction of the new lock and dam on the Lièvre River at Little Rapids. A large number of mining men were called as witnesses, including Messrs. Eugène Coste, M.E., Geo-

logical Survey, S. P. Franchot and Captain Henwood of the Emerald Mines, Captain Macnaughton, Buckingham, Demers Brosseau, and others. A good deal of interesting evidence was adduced, but, being altogether too voluminous, it has been impossible to reproduce even a small portion of it here. His Honour took the case to *avizandum*, and judgment will be given in a day or two.

There are now in operation in South Carolina fourteen fertilizer factories, employing 885 hands, with a capital of \$3,852,000. The value of last year's product was \$3,396,000. Major E. Willis, Charleston, gives the following interesting particulars in a recent Report:

"The activity of the fertilizing industry has not been confined to this city, nor to the State, for there are many manufacturing in other Southern States that use the South Carolina phosphates for the manufacture of fertilizers. The business of these concerns is prosperous. This business is a boon to railroads and steamship lines. The shipments for the past three months, from Charleston alone, required over 1,500,000 sacks to hold the material. Over 2,062,500 pounds of burlaps were used in making the sacks, and over 11,250 cars were required to transport them, filled with fertilizers, over the railroads. The Charleston companies will consume, in making the year's supply of fertilizers, over 70,000 tons of phosphate rock, and nearly half as much sulphur, besides kainit, marl, potash, blood, fishscraps, bone black, azotin, nitrogen, tankage, cotton seed meal, and other materials.

Markets.

Nominal quotations by cable from England are 1s for 80%, 10d for 75% and 8½ for 70%, all with 1-5d per unit rise. Large sales have, however, been made at 11¼d per unit, with some small lots at 11½d. The raisers of Carolina phosphates have been making arrangements for getting better prices by concentrating sales, and an advance of ¾d per unit is being asked. It is hoped this will strengthen the market for Canadian lower grades which have felt the competition of French and Carolina phosphates. Montreal prices range from \$11 to \$15 f.o.b. according to quality.

Freight.

Large engagements of tonnage have been made for the season at 6s 3d to Liverpool. The regular lines are asking 7s 6d, but outside boats will soon be arriving and lower rates are expected. There will probably be an ample supply of tonnage during the season.

Du Lièvre.

Everything seems now to be favourable for the transportation of phosphate, of which there is a large quantity awaiting shipment at the various mines. The steamer Agnes commenced running on the 30th ult. and is doing a large business, while the Eva is kept busy towing phosphate down to the railway at the Landing.

The Plumbago Mill at Graphite City is again at a standstill. It may not be generally known that this is really a good property, but apparently in the wrong hands. It is not likely to be run this summer. It would cost something in the neighbourhood of \$5,000 to put it in good working condition.

The grinding mills at Bassin-du-Lièvre expect to start very shortly; the first operations will be on 100 tons of ore from the High Rock Mine. These mills have been closed down since last fall.

Rumour has it that Mr. A. F. MacIntyre, of Ottawa, has succeeded in floating a company to operate his property adjoining the celebrated Emerald Mines. The lots were originally owned by the Buckingham Mining Company.

Mr. Wm. Macintosh is opening out his lots on the 8th range of Denholm. Some 200 yards have been stripped showing a well defined vein of the mineral.

The annual general meeting of the Dominion Phosphate and Mining Company was held at Montreal on Tuesday, the 15th instant. The attendance was not so large as might have been expected. The doings of the company during the year were regarded as most satisfactory. Messrs. Chas. Kyte and W. A. Nicholls, two of the New York directors, visited the North Star Mines on Thursday, and were very much pleased with all they saw there. Under the able management of Captain Williams a good output has been made. Many new and rich shows have been opened and at present everything looks very promising. The present main shaft is down about 600 feet.

The Canadian Phosphate Company have commenced their shipments, and between four and five hundred tons have been hauled down the river. Captain Smith is pashing along with the construction of the new train line, and is providing ample accommodation for a largely increased force of workers. A new cobbing house 32 + 60 will be erected, and an endeavour will be made to secure a suitable tug boat and new scows to facilitate the movement of their output. Some new hoisting plant has been added during the month.

Close upon 600 tons of ore have been sent down from the High Rock Mines. At the time of our visit some difficulty was experienced on account of the dump pile still being in a frozen condition. Mr. Pickford has things well in hand at the mines.

Captain Henwood has between 40 and 50 hands working at the Emerald, producing a steady output. Shipping will be commenced at an early date.

The Little Rapids Mines look as well as ever; and here too a goodly quantity of ore awaits transportation.

Mr. S. P. Franchot reports favourably of his Central Lake Mines.

Templeton District.

Mr. Trimble and several directors of the Templeton & Blanche River Company, paid a visit to their mines on Thursday, the 17th inst., and found all the pits and openings looking well. Mr. Wm. Cassils, the President, has a large and very rich specimen of the mineral, weighing several hundred pounds on exhibition at his Montreal office.

Perth District.

Several parties are at present prospecting phosphate lands in the neighbourhood of Sydenham.

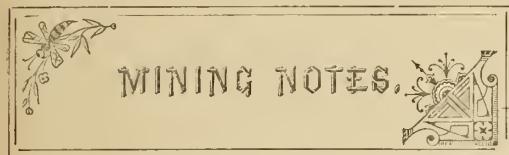
Mr. John Claxton, who has recently acquired the mining rights for the Conolly lot, has a number of men working and is meeting with encouraging success. Under the old management the property produced some 600 tons from surface workings, but as soon as enlarged operations became necessary the pits were abandoned. Mr. Claxton is a miner of experience, having been for a number of years at the Lake Opimicon mines.

Mr. James Foxton is working briskly on his location. Eight pits in all are being operated,

and at one point a tunnel 4 + 6 on a 15-inch vein of red phosphate is being driven into the hill. The shows in No. 1 pit are very promising.

Captain Moore, of Hurley, Wis., is expected on his newly acquired lots in a few days. His machinery will be in place by 1st of June, and operations will then be commenced with vigor.

Bush fires have commenced in alarming proximity to the Otty Lake Mines owned and operated by the Anglo Canadian Company.



We shall be greatly obliged to mine owners and superintendents for such authentic reports of their operations as may concern share holders and the public.

Newfoundland.

The Tilt Cove Copper Company, Limited, has been organized, with a capital stock of £160,000, shares £2 each, to lease or purchase mining properties at Tilt Cove, Newfoundland, granted to the vendors by the trustees of the estate of the late Charles Fox Bennett, June 24th, 1886, and made between Thomas Reynolds Smith, Charles Thomas Bennett and Arthur James Williams Bennett of the one part, and John Taylor of the other part.

Nova Scotia.

Work at many of the collieries has been slack for some time past, but probably not more so than is generally the case prior to the opening of navigation. Steamers are now daily expected at the wharves.

The Black Diamond Colliery is being worked steadily, and present indications are such that the company may look upon their enterprise as a success. It is the intention to drive a level drift from a point some 1,500 feet down the old slope to a seam, supposed to lie about 200 feet below the one at present worked; this will enable the management to prove the value of their second seam in the most economical manner possible.

At the Drummond Colliery every preparation has been made to meet the season's demand which, it is thought, will be in excess of former years. No. 4 slope has been put in good working order and mining can be commenced there whenever necessary. Preparations have also been going on in the old slopes from which a very large output may be expected. The sinking of slopes in the Scott pit is being pushed forward with vigour, and by the end of the present month will have reached a depth of 500 feet from the bottom of the shaft.

At the Albion Mines very little coal is at present being raised. The reopening of the slopes closed by the explosion has been suspended until sufficient water has been run into them to fill the opening between the two slopes; when this is done the work of reopening will be resumed. In draining the Food pit many difficulties have been encountered. The pumping engine can not be used as the pumps are not yet in running order, and owing to the damaged condition of the shaft the hoisting of the water is frequently interrupted. The sinking of the new slopes to the depth of the Cage pit seam is being continued day and night, and employers and employed look hopefully forward

to the successful reopening of this valuable and far famed seam.

At the Vale Colliery active operations are being conducted at both mines. Notwithstanding the influx of Belgians, good miners are still in demand. The latest arrivals here are a number of Welsh miners.

At the Springhill Mines things still continue dull, and many of the men are seeking employment. Early in the morning of the 13th inst. a fire occurred at the south slope, better known as the "Syndicate." Although it looked serious at one time the flames were subdued and no very serious damage was done. The slope has been idle for some time. Miners passed through the stables a few hours before, and found everything all right. This pit is free from gas and the origin of the fire is wrapped in mystery.

Latest advices from Bridgeport state that shipping has not begun yet owing to the coast being blocked with ice. Judging from appearances one is forced to believe that it will take a few days before the coast is sufficiently clear to admit of steamers getting into port.

Banking was suspended at Cow Bay during the last week in April. It is estimated that there are from 12,000 to 15,000 tons on the piles.

The *Stellarton Trades Journal* says: "The coke ovens are in full blast and turning out a superior quality of coke. There will be an addition to the number of ovens soon. Coke making may turn out an important industry in Cow Bay."

In addition to the work now being done in this district by the "Malaga Mining Company (Limited)" the *Critic* is informed that a crusher is about being erected on the Hall areas, which have been purchased by an American syndicate. Mr. Hall and Mr. Caldwell have lately been in the city arranging for the erection of the stamp mill. Indications point to the conclusion that this district will cause considerable stir before long.

From a lengthy advertisement in the *Royal Gazette* we gather that Charles R. Palgrave, of London, England, is the lessee of the gold areas situate at Hurricane Island, East Division of Isaac's Harbor Mining areas. That Mr. Palgrave means business is made evident from the fact that he is applying under the Act for authority to enter upon the land and prosecute mining, the ownership of the realty being uncertain. From all accounts gold mining in Guysborough County is to be vigorously prosecuted the coming season.

The following are the official gold returns so far received at the Mines Office for the month of April:—

District.	Mill.	Tons	Ounces
		Crushed.	Gold.
Darr's Hill.....	Dufferin.....	780	276½
Oldham.....	Oldham United.....	153	53
Waverly.....	Wallace.....	7	2½
Caribou.....	Moose River G. M. Co.....	183	92
Rawdon.....	Rawdon United.....	200	46½
Whiteburn.....	The McGuire.....	38	175
Stormont.....	Tributers.....	150	251½
Sherbrooke.....	No. 5.....	73	16

Londonderry despatches state that there is quite an excitement in town over the reported discovery of a very valuable seam of coal about half way between the blast furnace and Lon-

donderry station. It appears that a Mr. Patriquin and a practical Scottish miner went out in search of coal a few days ago, and after one and a-half hard days' work they struck, as he says, not a few bits of coal, but a big seam. As soon as it was discovered, they immediately covered it up, and Mr. Patriquin has secured the right of search, and will likely proceed at once to unearth the valuable deposit. It will be remembered that some two years ago there was a small company formed to dig for coal, and after they had expended some \$2,000, got discouraged and abandoned the search, and now Mr. P. has found what they were looking for, only a few yards from where they were digging.

New Brunswick.

Owing to suspension of Messrs. W. C. Pope & Co., of Boston, who are largely interested in the manganese mines at Markhamville, these mines are temporarily shut down, but Major Markham expects to have the mines and works in operation again very shortly.

It is said that Col. Dunnville—who has great force in organization of joint stock companies—has taken hold of the Mineral Vale Mine. He will probably succeed in making a sale of the property which has excellent prospects.

Capt. Alley, of Bar Harbour, Me., has commenced work again on his manganese property, in Parish of Waterford, with a small force.

The New Brunswick Government made a small appropriation during last session for the development of the mineral resources of the Province, but your correspondent has not yet heard how the amount is to be expended. A portion of it should certainly go towards exploring some of the salt deposits of Kings County.

Quebec.

The prospectus has been issued in London of Bell's Asbestos Company, to take over the business of John Bell & Son and buy and work the freehold deposit of asbestos at Thetford, Hayden and Belmina, Province of Quebec. The capital of the company is £200,000 in £5 shares. Only £100,000 will now be issued with £70,000 five per cent debentures, the latter redeemable at 15 premium at annual drawings. The company buys the Belmina estate from the firm at £8,394, Thetford at £41,300, and Hayden at £8,000.

The syndicate which purchased the mining rights on the "Nailon" property, near Buckingham, with a view to gold mining, will commence sinking a shaft there in the course of two or three weeks. The parties are determined to go through with it, and anticipate a handsome return for their investment.

Captain Bothwell, Buckingham, holds the following certificates of analysis from specimens of ore taken from his property:—

27th Sept., 1887, by Prof. J. T. Donald, Montreal, gold, 42 oz., 11 dwt., 16 grs. per ton.
7th October, 1887, by Prof. J. T. Donald, Montreal, gold, 1 oz., 9 dwt. per ton.
28th October, 1888, by Prof. J. T. Donald, Montreal, gold, 19 dwt. to the ton.
1st April, 1888, by J. T. Gore, State Analyst, Utah Assay Office, Helena, Montana, found 6.854 oz. of gold to the ton of 2,000 lbs, or gold value to ton of ore of \$141.68.

The Villeneuve Mica Company's mines continue to make steady output of merchantable mica.

Ontario.

The Kingston & Pembroke Iron Mining Co. has shipped its first cargo of ore since navigation opened, consigned to one of the largest consumers of ore in Pittsburg. If the ore is satisfactory, they agree to take all the product of the Willer mine.

A deposit of merchantable mica, said to be of good quality, is reported to have lately been found at Smithville, near Hamilton. A shaft is being sunk, and the value of the find will soon be known.

The Hopkins well at Port Colborne, Ont., was torpedoed a few days ago, and there is now an abundant supply of natural gas, sufficient, it is said, to run a large factory if applied as power.

The Copper Cliff mine at Sudbury is yielding very rich ore in immense quantities as the result of the trial shaft which was sunk during the past winter.

The Provincial Government intend having a big mineral exhibit at the Centennial Exposition of the Ohio Valley and Central States, to be held at Cincinnati from July 4 to Sept. 28. It is 100 years ago since the Ohio Valley was first settled, and the Exposition is in honour of the event. Mr. A. Blue, of the Agricultural Bureau, has been entrusted with getting up the exhibit, and acting under instructions from the Government he will make it as large and diversified as it is possible.

A local exchange says that Mr. R. Tough, of Sudbury, has returned from Chicago, where he sold to American capitalists a part of his interest in the gold mine, known as the Tough & Stobie claim, for the sum of \$32,000. His visit to Chicago was made chiefly to purchase machinery for the use of the company in working the mine referred to. He succeeded in securing a five stamp mill, with all its appurtenances and other machinery required in gold mining operations, all of which will arrive at Sudbury in a few days. He reported that the cost of this will amount to \$70,000. The extraordinary value of this mine has profoundly interested the mining fraternity of America in the mineral deposits of Nipissing and Algoma, and these districts will be thoroughly explored by experienced prospectors this coming season.

At the Bristol Iron mines work has been, and is still, suspended until proper transportation facilities for the moving of the ore can be granted either by the C.P.R. or the Pontiac Pacific Railway, the mines being located about midway between these roads. During the present Session of Parliament the Pontiac and Renfrew Railway Co. secured a charter for a new line to connect the C.P.R. and P.P.R. by way of the Bristol mines, and the company expect that if the Government grants aid to any railway enterprise this year, this new line will not be overlooked. As it is of the utmost importance to the counties of Pontiac and Renfrew that these productive mines should be vigorously developed, nothing short of a railway—the distance from either line is only three miles—will suffice for the proper handling of the product of the mine. Parties from Montreal have been visiting the mines lately, with the object of establishing smelting works, but we understand no definite action has yet been taken in the matter.

In reply to an enquiry as to the recent gold discoveries reported in the Cartier district,

Dr. Selwyn, Director of the Geological Survey, writes us as follows :—

"I could not possibly say whether the gold discoveries you refer to will or will not turn out valuable. I only know that a number of persons have been prospecting in that region, and some have brought in samples of quartz said to have been found there. Some of these are very rich in visible free gold, others on assay gave variable, but small quantities of gold per ton, while in yet others no trace could be found. Geologically speaking, I may say that the rocks are similar, and probably of the same age as others elsewhere in which paying gold veins have been found, and it is highly probable that some of the veins will prove valuable, and others too poor to work. This can, however, only be determined by practical working tests in each case. Cartier township is a few miles N.W. of the C. P. R. Crossing of the Vermillion River, and the rocks there resemble closely the gold bearing rocks of Nova Scotia, so much so, indeed, that I have repeatedly told enquirers that I considered that district a very favourable one in which to prospect for gold, and the most likely places are near and around any granitic masses."

Port Arthur District.

News from the mines is very scanty at present, owing to the almost impassable state of the roads. The melting of the snow, which fell to such an enormous extent last winter, has swelled every little stream into a torrent, and almost cut off communication with the Silver Mountain Section.

The Beaver and Badger mines pursue the even tenor of their way satisfactorily as usual, there being nothing new to report from them.

Silver Mountain, West End, appears to be at last likely to come to the front and take its place among the working mines. Messrs. Nichol & Falco representing, we believe, Chicago capital, have been for some time endeavoring to secure this property, and it would appear that their negotiations have come to a satisfactory conclusion from the announcement made in the *Sentinel* that Mr. Nichol had just started (18 May) for the "West End," taking tools and supplies for working, as far as such supplies can be forwarded at present. No property in this district has ever offered a more encouraging prospect than this, and we trust and believe that the working of it will result in greatly increasing the confidence of those who have already invested in the district.

Manitoba and North-West Territories.

The special Mackenzie River Committee of the Senate, over which Dr. Schultz has so ably presided, will send an exploration party to the district; and accompanying it will be a naturalist to investigate the natural products of that great region, both as regards its vegetable as well as its mineral products. In the person of Mr. James Macoun the charge of making extensive collections both of the flora and fauna of that great basin has been entrusted. He is a son of Prof. Macoun, whose researches in the natural history of Canada are well known. Mr. Fawcett, D.L.S., has charge of the topographical part of the exploration.

Mayor Stewart, of Ottawa, President of the Canadian Anthracite Coal Company, reports a force of 160 men at work at the Banff mines. The daily output is about 400 tons. A new seam about 7½ feet thick is being developed. Shipments to San Francisco during the past

five months, when the first shipment was made, amounts to over 10,000 tons, and there are the brightest prospects of the trade being largely increased.

British Columbia.

By the arrival of the steamer *Dunsmuir* last evening we learn, says the *Free Press*, that the work at the Comox Mines of Dunsmuir & Sons is progressing rapidly. Already three miles of the railway line have been cleared and the logs burned. The steamer *Pilot* took up a scow laden with machinery and rails for the new mines. The machinery will be hauled over the old road to the mines. The opening of the seam of coal is progressing vigorously. Mr. Bryden, the manager of the Wellington collieries, and Mr. Jas. Dunsmuir are at the mines superintending the work.

Work is progressing steadily at the Nicola Mines, sinking and drifting. The vein is now down 125 feet and increasing in width and richness, being 200 per cent. better at the present time than when work was commenced a short time since.

MISCELLANY.

Canadian Iron Mines.—(1) In spite of the proverb that comparisons are odious, it is well to learn a lesson sometimes in this way, especially in commercial matters. Glancing at the comparative development of the mineral resources of this country and of the United States, we are struck at once with a sense of the absurdity of the difference. We have in the States the mineral area known as the Lake Superior region where the mining interests have been largely developed. The output of iron ore in this section has risen from 3,000 tons in 1854 to 3,179,511 tons in 1886, and this year will probably overrun 4,000,000; a very large proportion, certainly two-thirds, of this, goes to furnaces distant 500 to 700 miles from the mines. The trade also is chiefly in the same direction, so that there is not much return freight. In Canada we have deposits of equal value and from 100 to 300 miles nearer to the furnaces. What development have these deposits received? We could ship ore to these furnaces and get return freights of coke or coal wherewith to run furnaces at the mines or at any convenient points on the lines of railway or on the shores of Lake Ontario. In the State of Michigan there are 26 furnaces; 15 of these were in active operation in 1886, and made a total output of about 140,000 tons of pig iron; many of these furnaces are between 300 and 400 miles from the mines. How many furnaces have we in Ontario? There are furnaces in and near Detroit, which, besides getting their ore from the Lake Superior region, have to bring their charcoal 150 to 200 miles by rail. In Ontario we can place our furnaces within from 10 to 30 miles of the mines and have our charcoal made at the furnace, or supply them with coke and coal as above stated. Some people object that we cannot keep furnaces going in Canada without protection against the United States. What protection have the Michigan furnaces against the rest of the furnaces in the United States? All we want is a fair field and no favour. Others object that we have not the proper mixture of ores wherewith to run satisfactorily, especially on carwheel

iron. Being a practical furnace man and well acquainted with the Canadian ores, I can positively state that we have what is needed and of first class quality. The fact is that we have every natural advantage, and the only thing that prevents the development of our mines and the kindred industries to an extent of which few can form any idea is the unfortunate fiscal separation from our neighbors across the line. In what condition would the State of Michigan with her mineral and timber resources be if she had been protected from the rest of the States? Just as Canada is, and perhaps worse, though it is hard to imagine anything worse as regards mining matters.

The Analysis of Natural Gas.—Professor C. Phillips (2), in a report on the chemical composition of natural gas, states that in analysing the various gas samples the method he adopted was as follows:—The determination of the carbon and hydrogen existing in combustible form was conducted by combustion over copper oxide in a porcelain tube, kept at a bright red heat, the carbonic anhydride and water formed being collected and weighed. For the absorption of the water, sulphuric acid of 1.71 specific gravity, followed by phosphoric anhydride, was employed, and for the absorption of the carbonic anhydride a solution of caustic potash in glycerine. The gas was carried through the red hot porcelain tube by a slow current of dry nitrogen. No oxides of nitrogen could be detected in the condensed water. For the determination of the nitrogen in the gas a porcelain tube filled with copper oxide was heated strongly, and after the air present had been carefully expelled by carbonic anhydride, 100 cubic centimetres of the natural gas under examination was allowed to flow slowly through the tube, being carried forward by a current of carbonic anhydride. The gas being burnt, the residual mixture of carbonic anhydride and nitrogen was collected in the ordinary manner over caustic potash, and the nitrogen measured. The nitrogen so obtained was then treated again in a similar manner, to ensure the complete combustion of the other gases with which it was originally in admixture. In only a few cases, however, was the nitrogen collected after the first combustion found to be impure. The tests for oxygen on 100 cubic centimetres of gas, using an Elliott apparatus, and caustic soda and pyrogallie acid as the absorbent, were in all cases negative. The author, therefore, found it necessary to conduct the tests at the gas wells. A slow current of gas taken directly from the well or main was caused to flow successively

through solutions of caustic potash and pyrogallie acid for ten minutes, in order to expel dissolved air. The two solutions were then mixed without stopping the current of gas, which was continued for some time longer. If the mixed solutions then exhibited a brown colour, it was considered that the presence of oxygen was established. For the determination of the free hydrogen the method of Hempel was adopted: 100 cubic centimetres of the gas to be examined was freed from carbonic anhydride and washed with strong alcohol until the higher hydrocarbons were removed, this operation being performed in an Elliott apparatus having a water-jacket. The residual gas mixed with two or three times its volume of air, was then passed over asbestos coated with 30 per cent. of palladium sponge at a temperature of 90 degrees C. By this treatment the hydrogen alone is burnt, provided the higher paraffines, including ethane, have been previously removed by alcohol. From the contraction of volume after passing the palladium, the proportion of free hydrogen is easily determined. The method is very accurate when methane is the only hydro-carbon present, but is inaccurate in the presence of ethane and the higher members of the series. When these are present, the washing with alcohol must be long continued. The olefines, as a group, and carbonic oxide are much more easily determined in natural gas than the paraffines and free hydrogen. The olefines are rapidly absorbed and removed by bromine water, and carbonic oxide by cuprous oxide, these reagents being used in the order named. Unfortunately, however, they are also solvents, in less degree, for the paraffines ethane, propane, &c. Hence, a gas perfectly free from carbonic oxide and the olefines is liable, on being washed with bromine and cuprous chloride solution, to undergo a reduction in volume, which may lead to a wrong conclusion. For the determination of the olefines and carbonic oxide the following process, based on their solubility in cuprous chloride, was therefore employed:—At the gas well a stream of gas was caused to pass slowly for two hours or more through 100 cubic centimetres of a solution of cuprous chloride. A quart flask provided with a glass delivery tube and a funnel tube reaching to the bottom was then filled with boiled water, and the cuprous chloride solution poured into the flask through the funnel tube. The flask was then heated, the water boiled for three hours, and the gas evolved collected. The gas so collected was transferred to an Elliott apparatus and the olefines and carbonic oxide absorbed as before described. For the detection of ammonia

the gas at the well was caused to bubble through water purified by distillation with sulphuric acid and potassium permanganate. This was afterwards tested by Nessler's solution. The author observes that the test for ammonia should be made in the case of an examination of natural gas, as solid masses of ammoniac carbonate are reported to have been thrown out from the pipes leading from gas wells in the Murphysville gas field. The author also describes the manner of calculating the results of the analysis, and the method employed in taking the gas samples.

Ontario to the Front!

A Matter of Vital Importance.

The following unsolicited opinions from your friends and neighbors, men and women, who you know and respect, ought to carry conviction to any doubting mind. These words of gratitude are from those who have been afflicted but are now well, and the persons giving them a naturally solicitous that others, troubled as well they, may know the means of cure. There is no reason why you should be longer ill from kidney, liver or stomach troubles. You can be cured as well as others. Do not longer delay treatment, but to-day obtain that which will restore you to permanent health and strength.

296 McNab St. North, HAMILTON, Can., Nov. 2, 1886.—I had been suffering for over twenty years from a pain in the back and one side of the head and indigestion. I could eat scarcely anything, and everything I ate disagreed with me. I was attended by physicians who examined me and stated that I had enlargement of the liver, and that it was impossible to cure me. They also stated that I was suffering from heart disease, inflammation of the bladder, kidney disease, bronchitis and catarrh, and that it was impossible for me to live. They attended me for three weeks without making any improvement in my condition. I commenced taking "Warner's Safe Cure" and "Warner's Safe Pills," acting strictly up to directions as to diet and took thirty-six bottles, and have had the best of health ever since. My regular weight used to be 180 lbs. When I commenced "Warner's Safe Cure" I only weighed 140 lbs. I now weigh 210 lbs.

Mos. S. Furber

St. Catherines, Ont., Jan. 24th, 1887.—About six years ago I was a great sufferer from

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42 Front St. East,

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33 Wellington St. East.

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BOOTS, SHOES, RUBBERS, SPORTING BOOTS, TRUNKS, VALISES, Etc.

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Our Patent FELT LAPLANDER is the best FELT BOOT made, as it is WATERPROOF as well as WARM.

We can supply any particular style if supplied with a sample, and shall be pleased to cater to the wants of mining and lumbermen's camps.

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kidney disease, and was in misery all the while. I hardly had strength enough to walk straight and was ashamed to go on the street. The pains across my back were almost unbearable, and I was unable to find relief, even temporarily. I began the use of "Warner's Safe Cure," and inside of one week I found relief, and after taking eight bottles, I was completely cured.

W. E. Kung

Manager for American Express Co.

Toronto, (18 Division Street,) Sept. 17, 1887.—Three year ago last August my daughter was taken ill with Bright's disease of the kidneys. The best medical skill in the city was tasked to the utmost, but to no purpose. She was racked with convulsions for forth-eight hours. Our doctor did his best and went away saying the case was hopeless. After she came out of the convulsions she was very weak and all her hair fell out. The doctor had left us about a month when I concluded to try "Warner's Safe Cure," and after having taken six bottles, along with several bottles of "Warner's Safe Pills," I saw

a decided change for the better in her condition. After taking twenty-five bottles there was a complete cure. My daughter has now a splendid head of hair and weighs more than she ever did before.

Mrs. Jas. Penn

CHATHAM, Ont., March 6, 1888.—In 1884 I was completely run down. I suffered most severe pains in my back and kidneys, so severe that at times I would almost be prostrated. A loss of ambition, a great desire to urinate, without the ability of so doing, coming from me as it were in drops. The urine was of a peculiar color and contained considerable foreign matter. I became satisfied that my kidneys were in a congested state and that I was running down rapidly. Finally I concluded to try "Warner's Safe Cure," and in forty-eight hours after I had taken the remedy I voided urine that was as black as ink, containing quantities of mucus, pus and gravel. I continued, and it was not many hours before my urine was of a natural straw color, although it contained considerable sediment. The pains in my kidneys subsided as I continued the use of the remedy, and it was but

a short time before I was completely relieved. My urine was normal and I can truthfully say that I was cured.

W. E. Kung

GALT, Ont., Jan. 27, 1887.—For about five years previous to two years ago last October, I was troubled with kidney and liver trouble, and finally I was confined to my bed and suffered the most excruciating pain, and for two weeks' time I did not know whether I was dead or alive. My physicians said I had enlargement of the liver, though they only gave me temporary relief. Hearing of the wonderful cures of "Warner's Safe Cure" I began its use, and after I had taken two bottles I noticed a change for the better. The pains disappeared and my system seemed to feel the benefit of the remedy. I have continued taking "Warner's Safe Cure" and no other medicine since. I consider the remedy a great boon, and if I ever feel out of sorts "Warner's Safe Cure" fixes me all right. I weigh twenty pounds heavier now than ever before.

John Gries

Inventor of the Maple Leaf Lance-tooth Cross-cut saw.

E. GAUJOT,
MINING ENGINEER,
BELLEVILLE, ONT.

- (1) Samul. D. Mills in the *Mail*.
- (2) Report for the Geological Survey of Pennsylvania.



NOTICE.

SEALED TENDERS addressed to the undersigned, and endorsed "Tender for Indian Supplies," will be received at this office up to noon of THURSDAY, 7th June, 1888, for the delivery of Indian Supplies during the fiscal year ending 30th June, 1889, consisting of Flour, Bacon, Groceries, Ammunition, Twine, Oxen, Cows, Bulls, Agricultural Implements, Tools, &c., duty paid, at various points in Manitoba and the North-West Territories.

Forms of tender containing full particulars relative to the Supplies required, dates of delivery, &c., may be had by applying to the undersigned, or to the Indian Commissioner at Regina, or to the Indian Office, Winnipeg.

Parties may tender for each description of goods (or for any portion of each description of goods) separately or for all the goods called for in the Schedules, and the Department reserves to itself the right to reject the whole or any part of a tender.

Each tender must be accompanied by an accepted Cheque in favour of the Superintendent General of Indian Affairs on a Canadian Bank, for at least five per cent of the amount of the tender, which will be forfeited if the party tendering declines to enter into a contract based on such tender when called upon to do so, or if he fails to complete the work contracted for. If the tender be not accepted, the cheque will be returned.

Each tender must, in addition to the signature of the tenderer, be signed by two sureties acceptable to the Department for the proper performance of the contract.

The lowest or any tender not necessarily accepted.

This advertisement is not to be inserted by any newspaper without the authority of the Queen's Printer, and no claim for payment by any newspaper not having had such authority will be admitted.

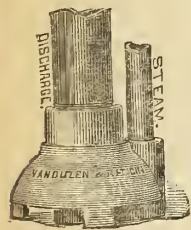
L. VANKOUGHNET,
Deputy of the Superintendent-General
of Indian Affairs.

Department of Indian Affairs,
Ottawa, May, 1888.

Van Duzen Steam Jet Pump.

MINING.—Our \$16 Pump preferred to a \$200 Steam Pump.

STATE OF MAINE ASSAY OFFICE,
F. L. BARTLETT,
PORTLAND, ME., June 21, 1883.



"GENTLEMEN,—The No. 5 'L' (\$16) Steam Jet Pump I purchased of you I have used for raising water from a mining shaft fifty feet deep. I set it to draught twelve and force thirty eight feet. It worked very well indeed, although I was obliged to carry steam 150 feet from the boilers and in weather often below zero. I carried 75 pounds of steam at the boiler, and the Jet Pump took the place of a No. 3 K (\$200 Piston Pump), that I had to remove.

"Yours truly, F. L. BARTLETT."

Address for further particulars,

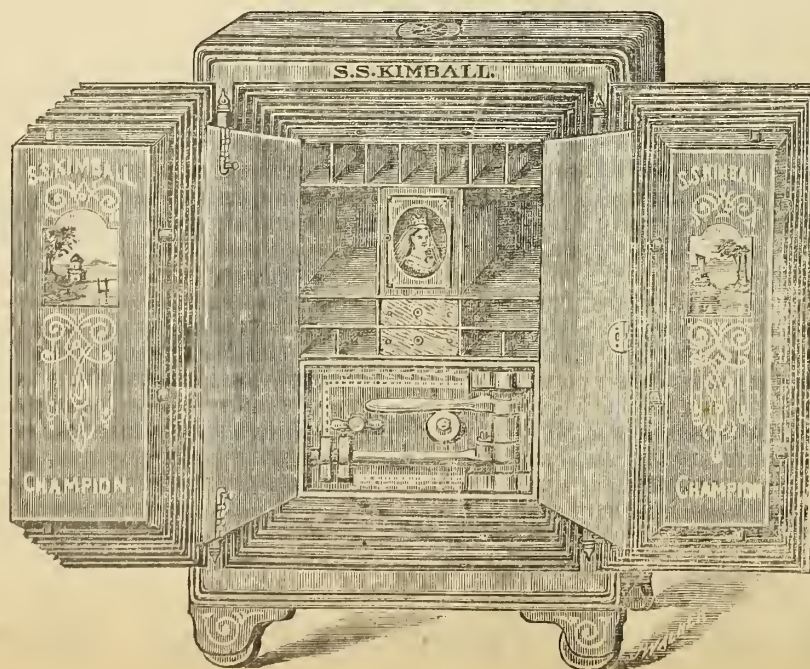
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VALUABLE PLUMBAGO AND OTHER

Mineral Lands FOR SALE,

IN THE TOWNSHIP OF BUCK-
INGHAM, COUNTY OF
OTTAWA.

1st.—Lot 28, in the 6th range, containing 100 acres, in addition to the salina of the lake.

2nd.—North half of lot 23, in the 5th range, containing 100 acres.

3rd.—Nine acres of lot No. 28, in the 5th range, with water privileges thereto appertaining, being site of mill dam, etc., etc.

The property formerly belonged to the Montreal Plumbago Mining Company, and was worked successfully for several years, until the company's mill was destroyed by fire, but the mill dam remains almost uninjured, and there are on the property several houses, sheds, etc., built for various purposes when mining operations were carried out.

The Plumbago Deposits

upon the property are regarded as amongst the richest and most extensive in the Dominion. As to the quality of the Plumbago, it has been extensively used in the manufacture of crucibles, lubricating leads, stove polish, etc., etc., and given unbounded satisfaction. This is established by the experience of consumers, and by a certificate from the celebrated Battersea Crucible Works, London, England, a copy of which is open for inspection.

MICA

has also been discovered in quantities.

The lands are in the Phosphate region, and recent prospecting has disclosed a rich and extensive deposit of this mineral. There are unrivalled facilities for transporting the ore to and from the mines by the Ottawa River and C. P. Railway. Distance from mines to Railway Station 6 miles. Good road.

All that is required to make these valuable mines handsomely remunerative is a little capital and enterprise.

The Title is Indisputable.

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OR TO THE OFFICE OF

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FOR SALE. VALUABLE Copper Mining Properties — IN THE — Eastern Townships.

TOWNSHIP OF ASCOT.

- 1st. Clark Mine, Lot 11, R. 7 Ascot 187 acres
2nd. Sherbrooke Mine, part Lots 12 and 13,
R. 7 Township of Ascot..... 329 "
3rd. Belvidere Mine, part Lots 9 and 10, R.
9 and 10, R. 8 Ascot 292 "
4th. Mining Rights in same vicinity on..... 250 "

All of the above properties lie within $1\frac{1}{2}$ miles of the Village of Lennoxville, at the junction of the Grand Trunk, Canadian Pacific and Passumpsic Railways, and have been developed to a considerable extent, and veins opened 6 to 20 feet in width, yielding 3 to 5 per cent. of copper, also silver, and 35 to 40 per cent. of sulphur. These mines are only $2\frac{1}{2}$ to 3 miles distant from the City of Sherbrooke, and evidently are of the same class of ores found at Copelton, only four miles distant, owned and worked by the Orford Copper and Sulphur Company, and by Messrs. G. H. Nichols & Co., of New York, which have proved so remunerative.

TOWNSHIP OF ORFORD.

- 5th. Carbuncle Hill Mine, Lots 2 and 3 R. 14, and 2, 3, 4 R. 15, 718 acres. Same class of ore as is found in the Ascot properties above described, but yielding a higher percentage of copper.

TOWNSHIP OF CLEVELAND.

- 6th. St. Francis Mine, $\frac{1}{4}$ Lot 25 R. 12, 50 acres, with dwelling houses, smith's shop, ore sheds and office, large winding and pumping steam engine, with boiler, winding and pumping gear, and about forty fathoms Cornish lifting pumps complete, railway tracks, ladders, etc., situated three miles from Grand Trunk Railway. A considerable amount of mining work has been done at this mine. A well defined vein richly charged with vitreous purple and yellow sulphurets of copper traverse the entire length of the property, five feet in thickness, yielding 8 to 40 per cent. metallic copper.

TOWNSHIP OF GARTHBY.

- 7th. Fifty-six lots of land, 2,938 acres. This property for the most part is unexplored, but copper is found on the greater part of the property. On one of the lots a vein about twenty feet in width has been found. Samples of the ore have yielded as much as 22 per cent. of copper, being also rich in sulphur. Other samples of pyrites from the same property, free from copper, have yielded as high as 48 per cent. of sulphur. The only drawback to this property is in its distance from the railway, it being about four miles from Garthby Station, Quebec Central Railway. A new line is chartered, however, which, when built, will run directly through the property.

TOWNSHIP OF ACTON.

- 8th. The Acton Mine, 100 acres, with engine, boiler, pumps and appliances. Within three years after this mine was first opened it produced nearly \$500,000 worth of copper. It is situated about half a mile distant from the stations of the Grand Trunk and South Eastern Railways.

- 9th. Brome Mine, part Lots 2 and 3 R. 4, 50 acres.
10th. Bolton Mine, two miles from Eastman Station, Waterloo & Magog Railway, 400 acres.

The above properties formerly belonged to the Canadian Copper and Sulphur Company, and were acquired by the present owner at sheriff's sale, giving an indisputable title thereto.

The whole or any portion of the property will be sold at reasonable prices.

For further information apply to

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Will buy undeveloped iron ore and other mineral properties.

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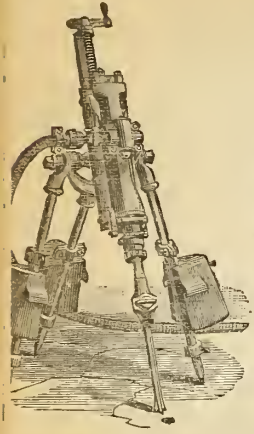
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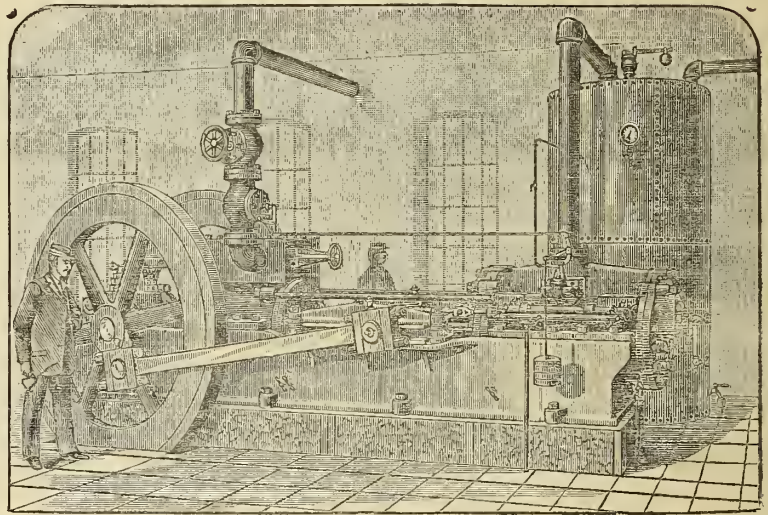
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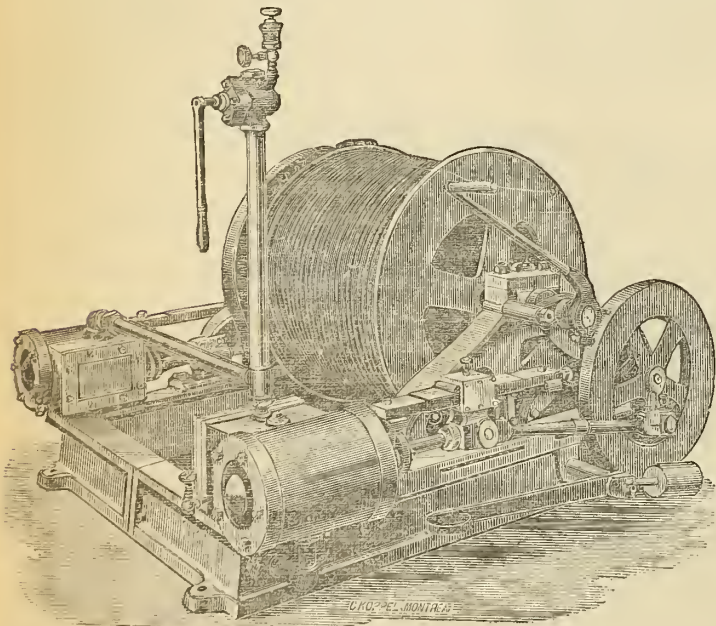


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Drill Steel, Wire Rope,
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ALL KINDS OF SUPPLIES
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On Lots 27, 28 and 29, in Range A, of Colrairie,
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300 ACRES,

One Mile from Quebec Central Railway.

Free from Reserves or Royalties.

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THE MOST COMPLETE OUTFIT IN THE DOMINION FOR ALL KINDS OF ANALYSES.**A SPECIAL DEPARTMENT**

Has been just completed for the **Analysis of Phosphate**, and will be found to answer most satisfactorily the wants of the Phosphate industry.

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The Perfection Smoke Consumer & Fuel Economizer.

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At City Waterworks (Wheelhouse), C.P.R. Works and Canadian Rubber Co., Montreal

Users of Lancashire, Cornish, and other flued boilers, invited to correspond.

Improved method of testing for new and existing boilers.

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Department of Inland Revenue.

An Act Respecting Agricultural Fertilizers.

The public is hereby notified that the provisions of the Act respecting **AGRICULTURAL FERTILIZERS** came into force on the 1st of January, 1886 and that all Fertilizers sold thereafter require to be sold subject to the conditions and restrictions therein contained—the main features of which are as follows:

The expression "fertilizer" means and includes all fertilizers which are sold at more than **TEN DOLLARS** per ton, and which contains ammonia, or its equivalent of nitrogen, or phosphoric acid.

Every manufacturer or importer of fertilizers for sale, shall, in the course of the month of January in each year, and before offering the same fertilizer for sale, transmit to the Minister of Inland Revenue, carriage paid, a sealed glass jar, containing at least two pounds of the fertilizer manufactured or imported by him; and such sample shall be preserved by the Minister of Inland Revenue for the purpose of comparison with any sample of fertilizer which is obtained in the course of the twelve months then next ensuing from such manufacturer or importer, or collected under the provisions of the Adulteration Act, or is transmitted to the chief analyst for analysis.

If the fertilizer is put up in packages, every such package intended for sale or distribution within Canada shall have the manufacturer's certificate of analysis placed upon or securely attached to each package by the manufacturer; if the fertilizer is in bags, it shall be distinctly stamped or printed upon each bag; if it is in barrels, it shall be either branded, stamped or printed upon the head of each barrel or distinctly printed upon good paper and securely pasted upon the

head of each barrel, or upon a tag securely attached to the head of each barrel; if it is in bulk, the manufacturer's certificate shall be produced and a copy given to each purchaser.

No fertilizer shall be sold or offered or exposed for sale unless a certificate of analysis and sample of the same shall have been transmitted to the Minister of Inland Revenue and the provisions of the foregoing sub-section have been complied with.

Every person who sells or offers or exposes for sale any fertilizer, in respect of which the provisions of this Act have not been complied with—or who permits a certificate of analysis to be attached to any package, bag or barrel of such fertilizer, or to be produced to the inspectors to accompany the bill of inspection of such inspector, stating that the fertilizer contains a larger percentage of the constituents mentioned in sub-section No. 11 of the Act than is contained therein—or who sells, offers or exposes for sale any fertilizer purporting to have been inspected, and which does not contain the percentage of constituents mentioned in the next preceding section—or who sells or offers or exposes for sale any fertilizer which does not contain the percentage of constituents mentioned in the manufacturer's certificate accompanying the same, shall be liable in each case to a penalty not exceeding fifty dollars for the first offence, and for each subsequent offence to a penalty not exceeding one hundred dollars. Provided always that deficiency of one *per centum* of the ammonia, or its equivalent of nitrogen, or of the phosphoric acid, claimed to be contained, shall not be considered as evidence of fraudulent intent.

The Act passed in the forty-seventh year of Her Majesty's reign, chaptered thirty-seven and entitled, "*An Act to prevent fraud in the manufacture and sale of agricultural fertilizers*," is by this Act repealed, except in regard to any offence committed against it or any prosecution or other act commenced and not concluded or completed, and any payment of money due in respect of any provision thereof.

A copy of the Act may be obtained upon application to the Department of Inland Revenue, as well as a copy of a Bulletin which it is proposed to issue in April, 1888, concerning the fertilizers

E. MIALL,
Commissioner.

15th Dec., 1887.

Canada Atlantic Railway

THE

SHORT FAST PASSENGER ROUTE

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OTTAWA & MONTREAL**and all points East and South.**

The only road in Canada running trains lighted with Electricity and heated by steam from the engine.

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Only line running through Sleeping Cars Landing

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Baggage checked to all points and passed by Customs in transit.

During season of navigation close connections are made with Richelieu and Ontario Navigation Co.'s Steamers at Coteau Landing, shooting the St. Lawrence Rapids.

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**TENDERS.**

SEALED TENDERS, marked "For Mounted Police Provisions and Light Supplies," and addressed to the Honorable the President of the Privy Council, Ottawa, will be received up to noon on Tuesday, 15th May, 1888.

Printed forms of tenders, containing full information as to the articles and approximate quantities required, may be had on application at any of the Mounted Police Posts in the North-West or at the office of the undersigned.

No tender will be received unless made on such printed forms.

The lowest or any tender not necessarily accepted.

Each tender must be accompanied by an accepted Canadian bank cheque for an amount equal to ten per cent. of the total value of the articles tendered for, which will be forfeited if the party declines to enter into a contract when called upon to do so, or if he fails to complete the service contracted for. If the tender be not accepted the cheque will be returned.

No payment will be made to newspapers inserting this advertisement without authority having been first obtained.

FRED WHITE,
Comptroller N. W. M. Police.
Ottawa, March 20th, 1888.

**INDIAN LANDS**

LANDS IN THE UNDERMENTIONED localities are offered for sale to actual settlers through the following Indian Agents: On the Great Manitoulin Island, Lake Huron, Ontario; Mr. J. G. Phipps, of Manitowaning, is the Agent for the sale of lands in the following Townships on this Island: Assiginack, Bidwell, Howland, Shequandah, Billings, Campbell, Carnarvon, Allan, Tehkumamah and Sandfield, and in the Townships of Shequandah, Manitowaning and Shaftsbury (commonly called Little Current). Mr. B. W. Ross of Cockburn Island, is the Agent for the sale of lands on that Island and in the Townships of Gordon, Mills, Burpee and Barrie Island, and in the Township of Gore Bay as well as for those in the Townships of Robinson and Dawson, on Manitoulin Island. Leading roads have been constructed throughout the Great Manitoulin Island.

On the Saugeen Peninsula, Ontario, the lands in the Townships Amabel, Albemarle, Keppel, Eastnor, Lindsay and St. Edmunds; as well as several Townships in the Peninsula, are offered for sale through Mr. William Simpson, Indian Lands Agent at Wiarton, County of Bruce, Ontario.

On the Garden River Reserve, Ontario, Mr. William Van Abbott, of Sault Ste. Marie, is the Agent for the sale of lands within this tract, and which are situated in the Townships of Macdonald, Laird and Meredith; also for lands within the tract commonly known as the Batchewana Bay Indian Reserve, and comprised in the Townships of Aweres, Fenwick, Kars, Pennefather, Dennis, Herrick, Fisher, Tilley, VanKoughnet, Tupper and Archibald. There is a leading road through these lands which affords ready communication with other parts of the country to intending settlers.

The condition of sale in respect to the lands within the Townships above described can be ascertained on application to the respective Agents.

(Signed) **L. VANKOUGHNET**

Deputy Supt. General of Indian Affairs.

Department of Indian Affairs,
Ottawa, February, 1887.

**Notice to Contractors.**

SEALED TENDERS addressed to the undersigned, and endorsed "Tender for Post Office, etc., Prescott, Ont.," will be received at this office until Thursday, 31st May, 1888, for the several works required in the erection of Post Office at Prescott, Ont.

Specifications and drawings can be seen at the Department of Public Works, Ottawa, and at the office of E. Jessup, Esq., Collector of Customs, Prescott, on and after Saturday, 12th May, and tenders will not be considered unless made on the form supplied and signed with actual signatures of tenderers.

An accepted bank cheque, payable to the order of the Minister of Public Works, equal to five per cent. of amount of tender, must accompany each tender. This cheque will be forfeited if the party declines the contract, or fail to complete the work contracted for, and will be returned in case of non-acceptance of tender.

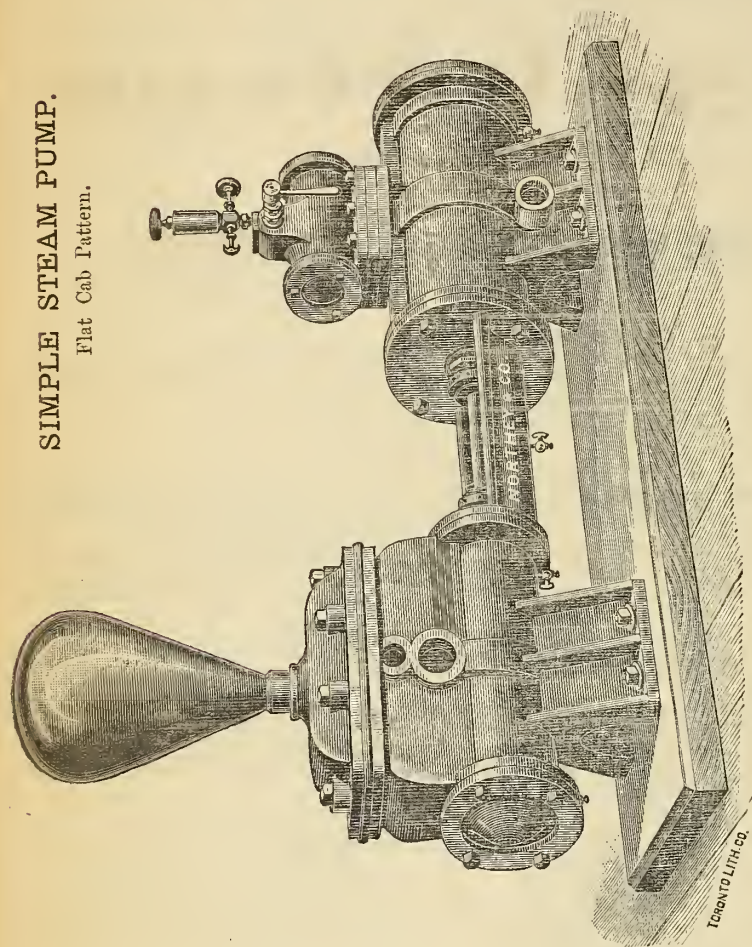
The Department does not bind itself to accept the lowest or any tender.

By order,
A. GOBEIL,
Secretary.

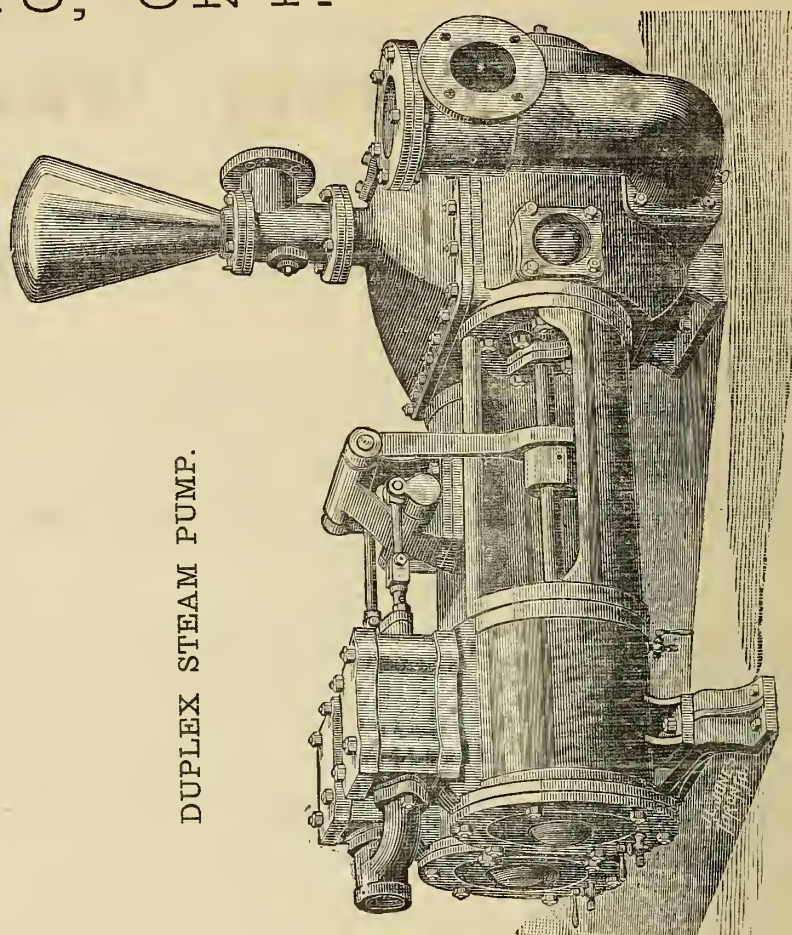
Department of Public Works,
Ottawa, 7th May, 1888.

Northey & Co's Steam Pump Works, TORONTO, ONT.

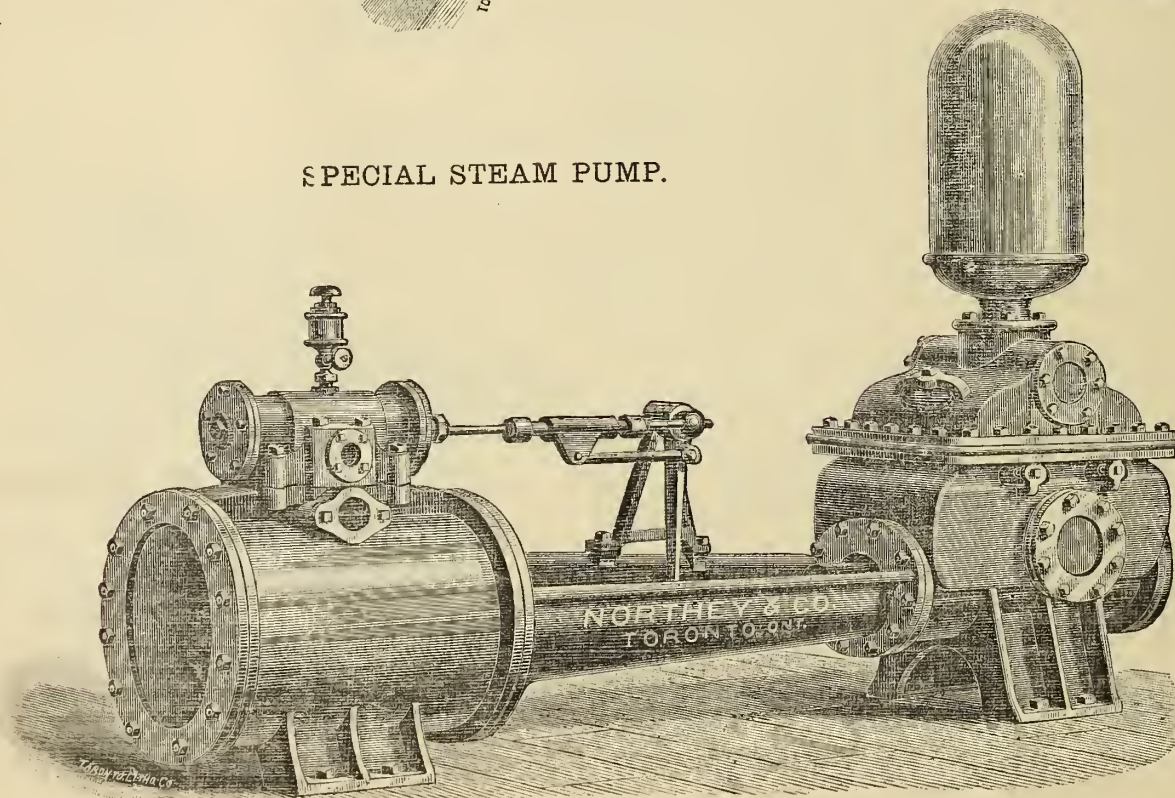
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Mining Regulations

TO GOVERN THE DISPOSAL OF

Mineral Lands other than Coal Lands, 1886.

THESE REGULATIONS shall be applicable to all Dominion Lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, iron or other mineral deposits of economic value, with the exception of coal.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein, either by surface or subterranean prospecting for mineral deposits, with a view to obtaining under the Regulations a mining location for the same but no mining location or mining claim shall be granted until the discovery of the vein, lode or deposit of mineral or metal within the limits of the location or claim.

QUARTZ MINING.

A location for mining, except for iron on veins, lodes or ledges of quartz or other rock in place, shall not exceed forty acres in area. Its length shall not be more than three times its breadth and its surface boundary shall be four straight lines, the opposite sides of which shall be parallel, except where prior locations would prevent, in which case it may be of such a shape as may be approved of by the Superintendent of Mining.

Any person having discovered a mineral deposit may obtain a mining location therefor, in the manner set forth in the Regulations which provides for the character of the survey and the marks necessary to designate the location on the ground.

When the location has been marked conformably to the requirements of the Regulations, the claimant shall within sixty days thereafter, file with the local agent in the Dominion Land Office for the district in which the location is situated, a declaration or oath setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as aforesaid; and shall, along with such declaration, pay to the said agent an entry fee of FIVE DOLLARS. The agent's receipt for such fee will be the claimant's authority to enter into possession of the location applied for.

At any time before the expiration of FIVE years from the date of his obtaining the agent's receipt it shall be open to the claimant to purchase the location on filing with the local agent proof that he has expended not less than FIVE HUNDRED DOLLARS in actual mining operations on the same; but the claimant is required, before the expiration of each of the five years, to prove that he has performed not less than ONE HUNDRED DOLLARS' worth of labor during the year in the actual development of his claim, and at the same time obtain a renewal of his location receipt, for which he is required to pay a fee of FIVE DOLLARS.

The price to be paid for a mining location shall be at the rate of FIVE DOLLARS PER ACRE, cash, and the sum of FIFTY DOLLARS extra for the survey of the same.

No more than one mining location shall be granted to any individual claimant upon the same lode or vein.

IRON.

The Minister of the Interior may grant a location for the mining of iron, not exceeding 160 acres in area which shall be bounded by north and south and east and west lines astronomically, and its breadth shall equal its length. Provided that should any person making an application purporting to be for the purpose of

mining iron thus obtain, whether in good faith or fraudulently, possession of a valuable mineral deposit other than iron, his right in such deposit shall be restricted to the area prescribed by the Regulations for other minerals, and the rest of the location shall revert to the Crown for such disposition as the Minister may direct.

The regulations also provide for the manner in which land may be acquired for milling purposes, reduction works or other works incidental to mining operations.

Locations taken up prior to this date may, until the 1st of August, 1886, be re-marked and re-entered in conformity with the Regulations without payment of new fees in cases where no existing interests would thereby be prejudicially affected.

PLACER MINING.

The Regulations laid down in respect to quartz mining shall be applicable to placer mining as far as they relate to entries, entry fees, assignments, marking of localities, agents' receipts, and generally where they can be applied.

The nature and size of placer mining claims are provided for in the Regulations, including bar, dry, bench, creek or hill diggings, and the RIGHTS AND DUTIES OF MINERS are fully set forth.

The Regulations apply also to

BED-ROCK FLUMES, DRAINAGE OF MINES AND DITCHES.

The GENERAL PROVISIONS of the Regulations include the interpretation of expressions used therein; how disputes shall be heard and adjudicated upon; under what circumstances miners shall be entitled to absent themselves from their locations or diggings, etc., etc.

THE SCHEDULE OF MINING REGULATIONS

Contains the forms to be observed in the drawing up of all documents such as:— "Application and affidavit of discoverer of quartz mine." "Receipt for fee paid by applicant for mining location." "Receipt for fee on extension of time for purchase of a mining location." "Patent of a mining location." "Certificate of the assignment of a mining location." "Application for grant for placer mining and affidavit of applicant." "Grant for placer mining." "Certificate of the assignment of a placer mining claim." "Grant to a bed rock flume company." "Grant for drainage." "Grant of right to divert water and construct ditches."

Since the publication, in 1884, of the Mining Regulations to govern the disposal of Dominion Mineral Lands the same have been carefully and thoroughly revised with a view to ensure ample protection to the public interests, and at the same time to encourage the prospector and miner in order that the mineral resources may be made valuable by development.

COPIES OF THE REGULATIONS MAY BE OBTAINED UPON APPLICATION TO THE DEPARTMENT OF THE INTERIOR

A. M. BURGESS,

Deputy Minister of the Interior.

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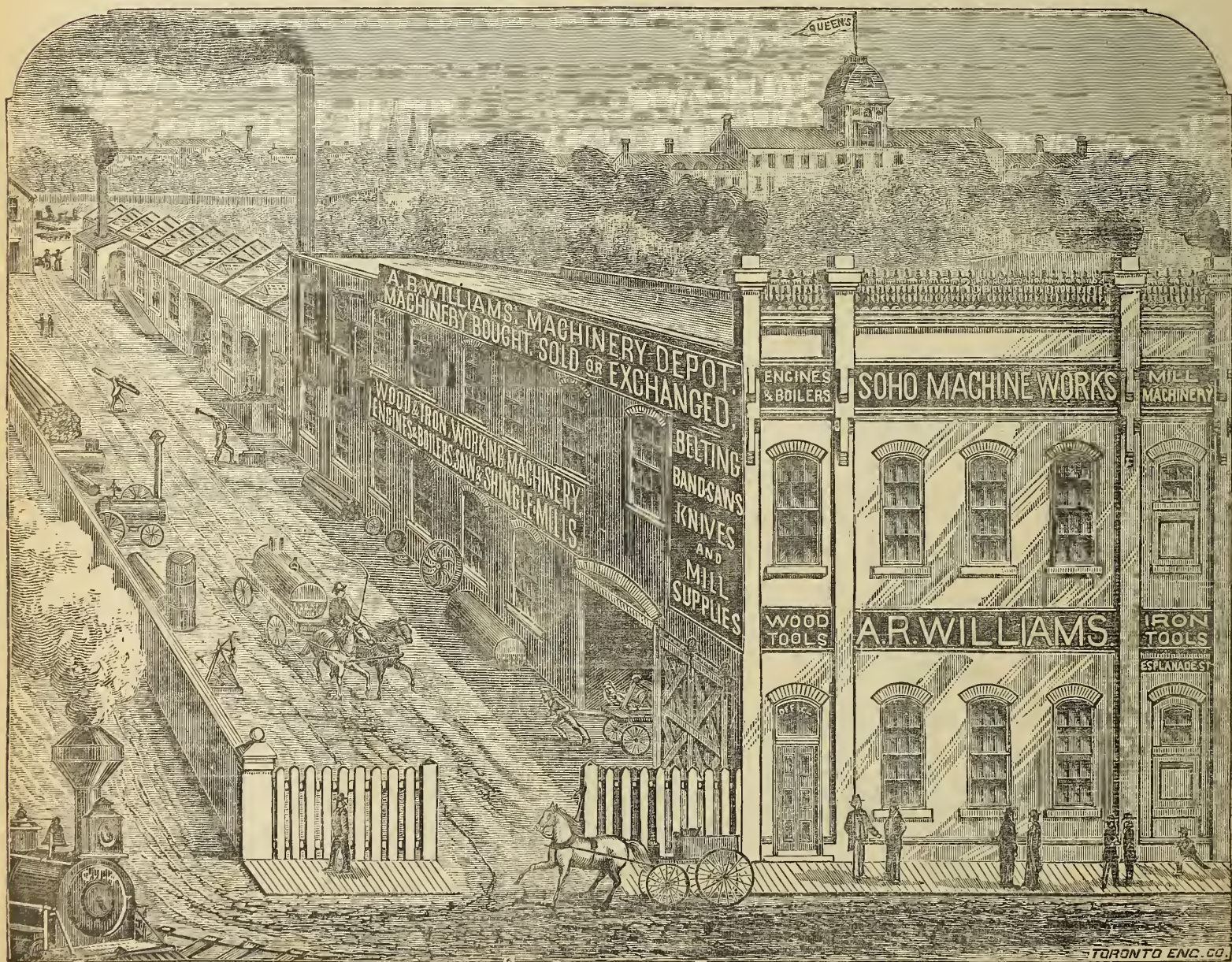
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MINING REVIEW

Canadian

Established 1882

Vol. VI.—No. 6.

1888. —OTTAWA, JUNE 1888.

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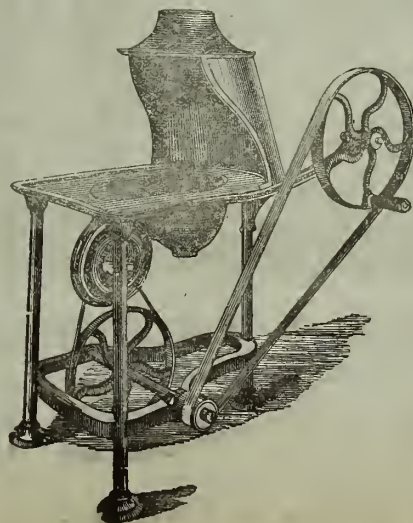
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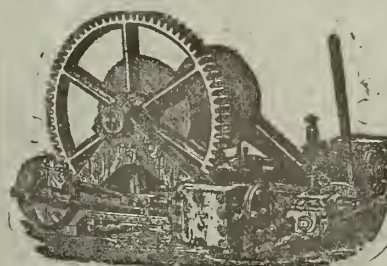
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HEAD OFFICE, - MONTREAL.

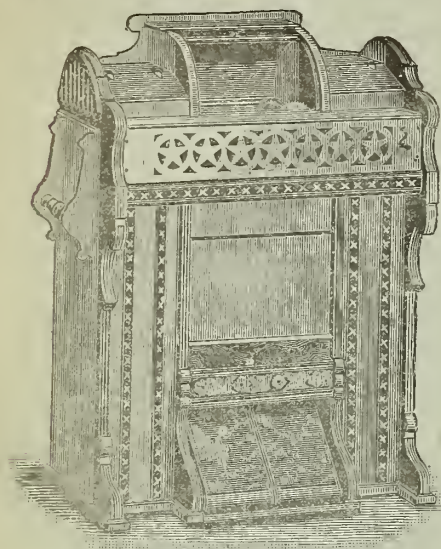
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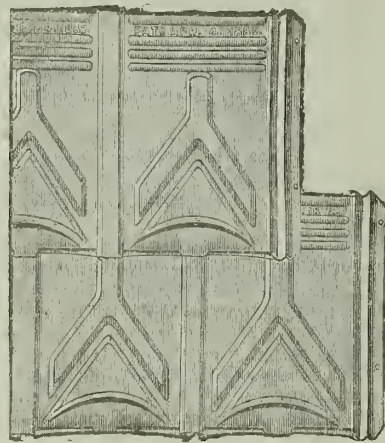
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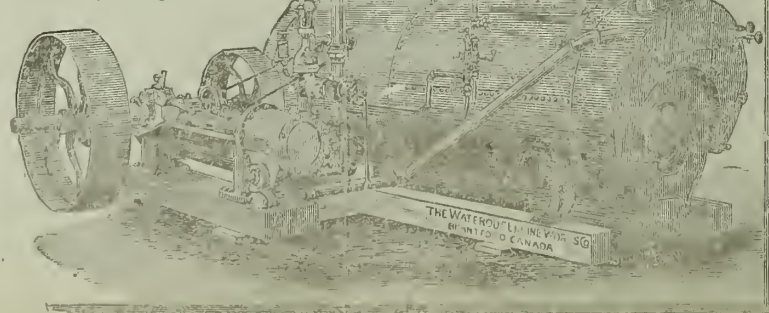
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Superstitious Regard of Asbestos.

M. R. H. Jones, of London, England, who has just published an interesting little brochure on "Asbestos: Its production and use; with some description of the Asbestos mines of Canada," is responsible for the following story: A Londoner, who had left the old country to seek a better fortune in the Dominion, found himself on arrival in one of the great lumber yards on the St. Lawrence, where energy and activity, supplemented by great physical strength, soon secured him a good position. It so happened, however, that one evening, on returning from their daily toil to their common apartment, some of his fellow-workmen saw him deliberately throw himself into a seat, kick off his boots, and then pull off his socks, and having opened the door of the stove, coolly fling them in on to the mass of burning wood. Possibly no particular notice would have been taken of this, judged as a mere act of folly and waste on the part of the newcomer; but when, almost immediately afterwards, they saw him open the stove door again,

take out the apparently blazing socks, and, after giving them a shake, proceed just as deliberately to draw them on to his feet again, that was a trifle too much! Human nature could not stand that. Consequently the horrified spectators, having for a moment looked on aghast, fled precipitately from the room. To them the facts were clear enough. This, they said, was no human being like themselves; such hellish practices could have but one origin. If not the devil himself, this man certainly could be no other than one of his emissaries. So off they went in a body to the manager and demanded his instant dismissal, loudly asseverating that they would no longer eat, drink, or work in company with such a monster. Enquiry being at once set on foot, it turned out that sometime before leaving England the man had worked at an asbestos factory, where he had learned to appreciate the valuable properties of this mineral; and being of an ingenious turn of mind, he had managed to procure some of the fiberised material and therewith knit himself a pair of socks, which he was accustomed to cleanse in the manner described. He was, as has been said, an unusually good workman, consequently his employers had no wish to part with him. Explanation and expostulation, however, were all in vain; nothing could remove the horrible impression that his conduct had made upon the minds of his superstitious fellow workmen; go he must and did, nor could the tumult be in any way allayed until he had been dismissed from his work and had left the yard."

Great Britain's Mineral Production.—As a raiser of minerals, Great Britain still maintains the proud position of being in front of the United States or any other nation. The quantity of iron ore raised in the States last year is estimated at eleven million three hundred thousand tons, against ten million tons in the previous year. It is interesting to observe that in Great Britain the quantity of ore mined in 1886 was fourteen million one hundred and ten thousand tons; the exact figures for 1887 are not available. Turning now to coal, the facts of the case show yet more in England's favour. The coal raised last year in America is returned as thirty-four million six hundred and forty-one thousand tons from the anthracite seams, and eighty-five million five hundred thousand tons from the bituminous seams, making an aggregate production of one hundred and twenty million one hundred and forty-seven thousand tons. The returns of the inspectors of mines for Great Britain give a gross tonnage of one hundred and sixty-two million one hundred and twenty thousand tons. The position which America has attained as an iron and steel and mineral producer should not be cause wholly for envy, but rather of admiration—for is not America the child of the mother country?

FOR SALE.

A COAL MINE IN CAPE BRETON,

Area, 970 acres, underlaid by 6 or 7 beds of the best Coal in Nova Scotia. The property is estimated to contain from 50 to 60 million tons of Coal. No Coal Mine can be more easily or cheaply operated. The angle of dip is 6 degrees, and the rock stratification is remarkably even and without fault or break.

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ALEXANDER CAMPBELL,
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June 12th, 1888.

The Canadian Mining Review

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JUNE, 1888.

No. 6.

Subscribers in arrear with their subscriptions will oblige with an early settlement. All unpaid accounts of this nature will be placed in the hands of our Solicitors for collection.

Minerals and Geology of Ontario and Quebec.

Chapman's Minerals and Geology of Ontario and Quebec, a copy of which is before us, is the most valuable manual of its kind which has made its appearance in Canada to the geologist and student, and is evidence of the deep interest taken by its writer in that branch of study—a study which, from the attention now being given to our mineral resources, promises to become the most valuable from every point of view, whether of the capitalist or the man of scientific pursuits. A similar work on a small scale preceded the present publication, but the exigencies of the times demanded and have called forth this new work in which the subject matter of the previous edition has been greatly extended. The properties by which minerals are determined are clearly stated, with descriptions of the same, and so plainly is this effected that the name of any ordinary mineral met with in Ontario and Quebec can be easily ascertained. The geological features of the two provinces are accurately described, and paleontology is so well placed before the reader with the means of studying it, that fossils need no longer be the sealed book they hitherto have been with the collector and the student. The whole is embellished with cuts and plates, which materially help those using this handbook to determine for themselves various specimens of a doubtful nature. A complete index, which acts as a table of reference is found at the end of the book, and besides being of great use as a table of contents, it forms also a list of the mineral products of the provinces which it embraces. To the prospector and the mining engineer the work must prove of great value; and in the Port Arthur district, amongst the Buckingham phosphate miners, and wherever iron deposits are being worked, we predict its usefulness will create a ready sale and active demand for it. In part III, the section devoted to mineral veins, is especially worthy of notice, and the various theories as to their origin, formation and existence are carefully written, and throw much light on a long vexed question. In part V, the section devoted to the Lower Ottawa district is of great interest to us locally, and the fossil fish and other organic remains found in the vicinity of Green's Creek, and in the boulder clay of the surrounding country are treated of. Geology as a study is more deeply followed by the present genera-

tion, than by their forefathers, to whom the surface soil was of greater value for their farming purposes than the underlying strata, whose hidden treasures were unknown to them. But with the progress of the country, education has progressed also, and the desire is now manifest on all sides to gain an insight into these natural resources of wealth which nature has so long ago stored up beneath our feet, waiting only the prying eye of science to explore. Professor Chapman's book will materially aid this search, and a careful perusal of its pages will save much unnecessary labour in prospecting where the signs he gives are wanting; whilst the knowledge given by indications pointed out by him will lead with a little care and discretion to the finding of mineral veins in places probably unlooked for or passed by from want of that knowledge. The value of this book to the public at large is far superior to the ordinary reports published by the Geological Survey, for while the latter deal with areas and sections of country from a scientific point of view, they convey no recommendations as to the probable results, or to richness and extent of mineral deposits. This volume in fact contains the pith of those reports, embellished with the writer's own ideas and deductions, and is in so concise and readable a form that its very size contributes to add to its usefulness. We consider it a handbook which should be in every library, and which no one interested in mining matters should be without. The publication is well got up, and although some of the cuts, particularly the fossils, are a little indistinct, the type, paper and binding are all good and would compare favourably with any English production. The publishers are Copp, Clark & Co., Toronto.

Natural Combustible Gas.

The Report of the Commissioner of Crown Lands of the Province of Quebec for 1887, just received, states that the gold mining license fees last year amounted to \$23, while the expenses incurred in their collection, and for the maintenance of police in connection therewith, reached the sum of \$2,416.80. The yield of gold is not stated.

The Report contains, in addition to the ordinary appendices on its transactions, a very interesting and exhaustive report by Mr. J. Obalski, Government Mining Engineer, on natural combustible gas, and the gas resources of the Province of Quebec, a subject which at the present moment is engaging general attention and which is worthy of more than a mere passing notice.

Mr. Obalski gives it as his opinion that the discovery of gas in a district would immediately raise the value of property considerably, while new industries would spring up there, especially should facilities be afforded them in the shape of cheap land and cheap gas. Opinions, he says, vary as to the origin of natural gas. Some admit that it is produced by the decom-

position of animal or vegetable organic remains accumulated since the earliest geological period. Others, whom he styles the practical class, hold that it is formed continuously by chemical reaction in the earth where hydrocarbons are formed which pass off into the higher parts when they find outlets and porous rock to absorb them. The companies, however, operating in natural gas maintain the first theory, and foresee exhaustion in time; to remedy which, it is proposed to manufacture artificial combustible gases at a very low cost.

Amongst the conditions under which workable accumulations of gas are likely to exist are the presence of organic remains in the rock, strataporous enough to store oil or gas, impermeable above and below, and with wrinkled or elevated parts where gas may collect. The principles are also laid down that as gas and oil have a common origin, they must be found in the same regions in variable proportions. In Ohio the gas is found in the Trenton limestone, composed of fossil shellfish, and Mr. Obalski remarks, by the way, that it is this formation in which the Province of Quebec is interested. The reason why the strata must be wrinkled is that if they were perfectly even the gas would be spread over a considerable surface, and no great repositories could exist. This is called an *anticlinal*, and in the Pittsburgh region of Pennsylvania all the rich gas wells are found on anticlinals, whilst outside of them the wells are poor. The gas is stored in its repositories under considerable pressure, and it is owing to this that it can be conveyed in pipes to long distances, the decrease in pressure being estimated about four lbs. to the mile. The mean pressure ranges from 375 to 500 lbs. and upwards at the repositories. Gas borings are similar to those made for oil, and to exclude water, an absolute necessity, special tubing and contrivances are employed. Judging from an estimate of similar work in the States, boring 2,000 feet through such rock as it is expected would produce gas in the Province of Quebec, with tools and tubing, would cost \$3,000. Boring, he says, is the best test in exploring, with judgment and regard to natural conditions. In boring in Ohio for gas, petroleum was struck; and on this point Mr. Obalski says: "In our Province we find ourselves placed in identical circumstances, and it is a matter of no doubt to me that we shall also find petroleum." After mentioning various points in the valley of the St. Lawrence where natural gas has been discovered, one boring at St. Gregoire being 1,115 feet, and another at Maissonneuve 1,500, he points out the fact that the Trenton limestone along the valley of the St. Lawrence, overlaid by the Utica, Hudson River and Medina schists, covered again by a layer of alluvium from 50 to 80 feet thick is favourable, wherever the limestone is covered and does not crop out on the surface, for the production of gas; and he adds that he is "thoroughly convinced, and his special study of the subject justifies him in expressing the

belief, that rich gas and petroleum districts exist in the region indicated by him." He believes that driving borings down to the Trenton limestone will give the best practical results, rather than working at random. Mr. Obalski states that when natural gas was discovered in the valley of the St. Lawrence the attention of the Geological Commission was called thereto, but it attached no importance to the fact. Now the whole utility of the Geological Survey ought to consist in aiding to develop any important discovery, and its report thereon would be of great importance to parties interested. This subject we commend to the notice of the Director of the Geological Survey. We further hope this short review of Mr. Obalski's report will draw out some remarks from our local geologists, and that their opinions may be given as to the probability of borings in this immediate vicinity yielding results that could be utilized here for manufacturing or illuminating purposes. We shall be happy to publish any such communications as being of great importance, not only to this vicinity, but to the community at large.

Government Assayists.

We are authorised by the Department of Interior to contradict the rumor that the Dominion Government have under consideration any proposal to establish Government Assayists at the various mining centres. Such a step, however desirable, is not at present contemplated.

Timber and Mineral Exhibit at Glasgow.

Recognising the importance of the opportunity offered in the International Exhibition recently opened at Glasgow, the Minister of Agriculture, in conjunction with Sir Charles Tupper, has secured one of the courts opening from the main gallery of the building, and this has been set apart wholly for the display of Canadian exhibits. The importance of this step will be readily admitted when it is remembered that Scotland has, from the commencement of the development of our country, supplied a most desirable class of settlers, many of whom have been in almost every walk of life, largely instrumental in helping Canada forward to the position in which she finds herself to-day. Like other portions of Great Britain, Scotland is at present suffering from agricultural and commercial depression, and it is certain that the opportunity thus afforded of examining the samples of our products will be largely taken advantage of, with the result that much useful information will be disseminated, and an impetus given to emigration from that portion of the United Kingdom. It is worthy of note that, although Canada has taken part in exhibitions in France, Belgium and England, this is the first occasion in which she has taken part in any exhibition in Scotland, and there can be little doubt of the wisdom of this step, which will give Scotchmen

an opportunity of judging for themselves of the capabilities of our country and of its great natural resources awaiting development. In an excellent mineral exhibit a sample block of Bituminous Coal is shown from Lethbridge Mines, in the district of Alberta, North-West Territory. It is taken from a seam 5 feet 2 inches in thickness, and lies in a field of great extent, which is computed to contain 5½ million tons to the square mile. A sample of the Anthracite Coal from the mines of the Canadian Anthracite Company in the National Park District of the Rocky Mountains is also shown. According to recent explorations this seam extends over a distance of 16 miles, and is found varying from a few inches to 40 feet in thickness. The metals embrace samples of iron, gold, silver, copper, lead and other ores, principally from mines in British Columbia and the eastern portion of the Dominion. A large obelisk represents the output of gold in British Columbia during the last twenty-five years, and a smaller one represents the yield in Nova Scotia during the same period.

The forest wealth of the Dominion is admirably displayed in a trophy of the woods of New Brunswick, which also serves to illustrate the growth of the Eastern Provinces generally. This trophy, which is about 30 feet in length, and 10 feet in height, has for its base 15 blocks of timber in the bark, comprising the kinds of greatest commercial value. The coniferous varieties being represented by hemlock, red and white pine, spruce and cedar; and the deciduous varieties embracing black and white birch, rock and scarlet maples, beech, black and white ash, red and grey oak, butternut, elm, basswood and poplar. The upper reaches of the trophy show polished samples of the boards and cross sections of these varieties, and an inclined frame running along the middle of the trophy is composed of samples of 30 smaller varieties of trees such as are for use in decorative work, and for other purposes. Besides this trophy, samples are shewn of the fir, maple, oak, yellow cypress, yew and arbutus, grown in British Columbia, while the dimensions of the Douglas pine of that Province are illustrated by means of a 45 inch cube of that variety, which was cut from one of the trees, which, until recently, occupied the town site of Vancouver, the terminus of the Canadian Pacific Railway.

"The Colliery Engineer."

A welcome addition to our list of exchanges this month is the *Colliery Engineer*, published monthly by the Colliery Engineer Company, at Shenandoah and Pottsville, Penna., under the joint editorship of Messrs. Thos. Jas. and Rufus J. Foster. The typographical appearance of the *Engineer* is good; its editorials are ably written; the descriptive and technical articles cover a wide field, and are contributed by thoroughly competent writers; while the selected matter is valuable and well chosen. We have to express our thanks to Mr. Rufus Foster for his courtesy in so kindly furnishing the cuts illustrating the article in this month's issue on "Untimbering of Stalls," which has been reproduced from this excellent journal.

LETTERS TO THE EDITOR.

We invite Correspondence upon matters consistent with the character of the REVIEW.
Be as brief as possible. The writers name in all cases required as a proof of good faith.
One dozen copies of the issue containing his communication will be mailed free to any correspondent on request.
We do not hold ourselves in any way responsible for the opinions expressed in this section of the REVIEW.

The Profits of Asbestos Mining.

THETFORD, QUE., 12th June, 1888.

The Editor

THE CANADIAN MINING REVIEW :

SIR,—Referring to my letter in last month's issue on this subject. In the prospectus of the recently formed Bell's Asbestos Company, the net profits of Mr. Bell's asbestos business are stated as : in 1885, £7,990 2s. 4d. stg. ; in 1886, £9,133 1s. 5d. ; in 1887, £15,859 5s. 7d. This alone shows the immense business done in asbestos, and as Mr. Bell is one out of a dozen, we can form some idea of the profits on the whole industry.

Yours, etc.,
"ASBESTOS."

General Geology of the Metalliferous Deposits of the Region North-West of Lake Superior.

By Andrew C. Lawson, M.A., Ph.D.

A brief statement of the broad relations which exist between the occurrence of the more valuable economic minerals and the various geological formations in the country north-west of Lake Superior may be of interest to those familiar with that region, and of practical service to those engaged in prospecting. Many of the facts are not new to students of the geology of the region, nor to old prospectors ; but they are not likely to be known to new men coming into the country. They are, therefore, given here, not as any contribution to our accurate knowledge of the features of the region, but as a *resumé* of salient facts which should be recognized by men in any way engaged in exploring for minerals.

The rock formations of the provincial districts of Thunder Bay and Rainy River are first separable into I. Archæan ; II. Post-Archæan (non-fossiliferous, so far as yet known).

The Archæan is easily separable, as every gold prospector in that country knows, into two main divisions, each composed of very different rocks from the other. These, though often much involved by the disturbances which have affected the crust of the earth, can be shewn by careful field study and mapping to be related to each other as upper and lower. They are, therefore, for convenience designated as Upper and Lower Archæan. The Lower Archæan is what is ordinarily known as Laurentian, and is made up almost entirely of a few kinds of granite and gneiss. These are geologically the lowest rocks known in the region.

The Upper Archæan comprises the various schists, greenstones, felsites, agglomerates, &c., which have ordinarily been known as Huronian. The studies of the writer in different parts of the region have shewn that this Upper Archæan is distinctly separable into at least two geological series of rocks ; and as there are some grave doubts as to the correctness of correlating either one of these series with the Huronian of Lake Huron, local names have been applied to them which will be of service till sufficient evidence

has been collected to settle the question of their proper correlation—a question which is at present exciting considerable interest among geologists, both in Canada and in the United States, owing chiefly to the valuable investigations of the late Prof. R. D. Irving, of the United States Geological Survey. To avoid for the present, therefore, this question of correlation, these two series are known as the Keewatin and the Coutchiching series. The latter is geologically the lower of the two, and is developed in great volume on Rainy Lake, Naneukan Lake and Nequaquon Lake. It is composed, so far as known, entirely of mica schists and fine grained, evenly laminated gneisses or feldspathic mica schists, with metamorphic minerals such as garnets, staurolite, &c. The series is remarkably evenly bedded, and all the evidence points to its being a series of metamorphosed sediments, no volcanic rocks being recognised in its entire thickness.

The Keewatin series is of wide distribution, and is the most interesting from an economic standpoint of the Archæan formations. It is ordinarily known to prospectors as the "green slate formation." In more precise, yet very general terms, it is composed of hornblende schists, greenstones or greenish altered traps, soft fissile green schists, more or less chloritic, quartz porphyries and the allied rocks, felsites, felsite schists and sericite schists, some clay slates, micaceous slates and mica schists, quartzites, grey-wackes and great thicknesses of greenstone and felsitic agglomerate. The Keewatin series, made up of more or less lenticular strata of these rocks, forms sharply folded troughs sunk into the Laurentian gneiss or resting upon the intervening Coutchiching schists. These troughs form on the surface belts which traverse the country in various directions. These belts have been traced more or less continuously from the Lake of the Woods to Thunder Bay, and, to anticipate, they are the gold-bearing rocks of the region. The Post-Archæan of the region includes the Animikie and the Keweenaw or Nipigon series.

Thus, beginning at the top of the geological column and going downwards, we have the following scale of formations, all of them of enormous thickness:—

Post-Archæan	{ Keweenaw or Nipigon.
(non-fossiliferous)	{ Animikie.
	(Profound geological break or interval.)
Archæan	{ Upper { Keewatin.
	{ Lower { Coutchiching.
	{ Laurentian.

Each of these five different assemblages of rocks is peculiar with reference to the occurrence of economic minerals. So far as experience teaches the Laurentian gneiss and granite is the most barren of all the formations of the region. Economic deposits do not, as a rule, occur in it, and this fact has become so well known that prospectors spend no time searching for gold in the "granite" country, but get back to the "green slate" or Keewatin rocks as soon as possible. There are, however, in many parts of the country veins of coarse pegmatite which traverse the Laurentian, and some of these will doubtless be found to yield white mica in sufficiently large sheets to be of value.

The rocks of the Coutchiching series are equally barren and are prospectively good, so far as the writer knows them, only for mica in the coarse granites which traverse them in certain parts.

The Keewatin rocks may be said to be rich in the various ores of the metals and in native gold, although it is only occasionally that they are sufficiently concentrated in nature to be of

economic value. The more prominent metalliferous deposits are gold (native and probably also as telluride), silver with the gold, magnetite, copper pyrites, iron pyrites and mispickel, with also galena and zinc blende.

The Post-Archæan Animikie is known to the miners as the "black silver bearing slates," the most prominent and characteristic metal of this formation being silver either native or as sulphide. Other metals are associated with it, but play usually a quite subordinate rôle in the vein deposits. The silver is quite as characteristic of the Animikie as the gold is of the Keewatin. Iron is also a characteristic metal of the Animikie just as it is of the Keewatin ; but while it occurs in the latter as magnetite, usually it would appear with some titanium in it, which lessens its value or renders it worthless if it be in considerable quantity, the iron of the Animikie is usually in the condition of hematite, and appears to occur in beds at the base of the series, associated with jasper and chert. Hematite, however, probably also occurs abundantly in the Keewatin rocks.

The still higher Keweenaw or Nipigon series is known as the Copper-bearing series and is characterized by great deposits of native copper.

It is a very difficult matter to suggest an explanation yet of the fact that these different formations should be so characterized by the presence of different economic metals, and although there are considerations which enable us to understand the peculiar relationship, no attempt will be made to go into them here. But the one great fact should be noticed that all the formations which are so characterized by the occurrence of peculiar metalliferous deposits are more or less abundantly made up of volcanic rocks, and that the formation of the deposits in question is intimately associated with the presence of these.

In the Coutchiching series, where we have no evidence of volcanic rocks, but a series of schists, evidently the result of the metamorphism of a great series of sedimentary strata laid down in a time of quiescence, we have no metalliferous deposits. In all the series above the Coutchiching volcanic rocks abound and so do metalliferous deposits. How is it with the Laurentian? Here we have an immense assemblage of rocks all the evidence concerning which points to their having solidified from a hydro-thermal fusion. They are plutonic rocks that have crystallized from a magma. How is it that we find no metalliferous deposits in them? The simplest explanation of this fact, and the one which is in accord with all the other facts which have come to the writer's notice in his study of the region is this: The Coutchiching and Keewatin series being eminently stratified and in one case made up of sedimentary rock and in the other of alternations of sedimentary and volcanic rocks must, *a posteriori*, have had a hard floor of some sort upon which they were deposited. As the strata accumulated upon this floor, to the depth of many miles, the floor sank within a zone of such temperature that it was fused. Along with the fusion of the floor there were included portions of the Coutchiching and Keewatin rocks. This fusion gave rise to a magma upon which rested as an unfused crust the rocks now known to us as the upper Archæan. Various disturbances and movements served to emphasize the sharpness of the line between the unfused rocks and the magma. This same disturbance seems to have facilitated the shattering of the crust in places so that very many detached pieces of it near the contact were caught up in the magma.

and retained there up to the time of solidification. These two processes, viz: the detachment of fragments of the crust so that they became imbedded in the magma, and the penetration of the same magma within the cracks of the crust gave to the contact of the upper and lower Archæan its eminently brecciated character. The solidification of this magma gave rise to the Laurentian gneiss and granite. Those rocks of the upper Archæan which are closest to the contact of the Laurentian, display the most pronounced metamorphism, while those which are farther from it are as a rule least altered.

Now by the fusion of this floor any metalliferous deposits that may have existed in it, in consequence of its being perhaps partly built up of volcanic rocks, would become disseminated through the whole magma and in any portion of it would be in too minute proportion to be detected by ordinary means. Of course if the floor upon which the Countiching and Keewatin rocks were deposited was the original crust of the earth then we would hardly expect metalliferous deposits to be segregated in it, and its refusion by sinking would not alter it in this regard.

The Untimbering of Stalls.

By Andre Dumont, Professor of Mining at the University of Louvain.

The support of the galleries and of the intervening stalls is often a considerable item in the cost of output per ton of coal. In Belgium the cost of timbering generally varies between 0.60 fr. (1) and 1.20 fr. per ton of coal extracted. In France the cost is from 0.30 fr. to 2 fr. In England—thanks to the condition of the strata and to the methods of working—it only costs from 0.20 fr. to 0.30 fr. In these different countries exceptional circumstances have now and then caused the price of timbering to overstep the limits which we have just indicated, and they have sometimes risen to 3 or 4 fr. or fallen to 10 centimes and under.

In short, the timbering is generally heavy in consequence of the yielding nature of the surrounding ground, principally the roof. It may be added that even in good ground the expense of timbering is of importance in proportion as the thickness of the bed increases. It would never do to proportion the length only of the props to the height of the roof; it is necessary also to give to them a section in relation to their length.

The quantity of wood which is every year buried in the workings, and which is entirely lost, is considerable. We have not the exact statistics of the wood consumed in the Belgian coal mines, but we believe that it shows an annual expenditure of about eight million francs. For a long time the question of supports has engaged the attention of coalowners, and they have made serious efforts to reduce the figure of the prime cost in the column of "timbering."

In bad ground the insufficiency of the supports has caused many accidents, and any direct economy has had to be given up. Certain owners have secured themselves against an exaggerated expense by an agreement for furnishing the necessary timber, based upon a rate per ton. This system does away with one of the cares of supervision, but it is nearly always burdensome for the owner. Before abandoning the galleries and filling them up again, it is occasionally the rule to draw out a part of the framework. But is this system of untimbering regularly carried out? Undoubtedly not. And

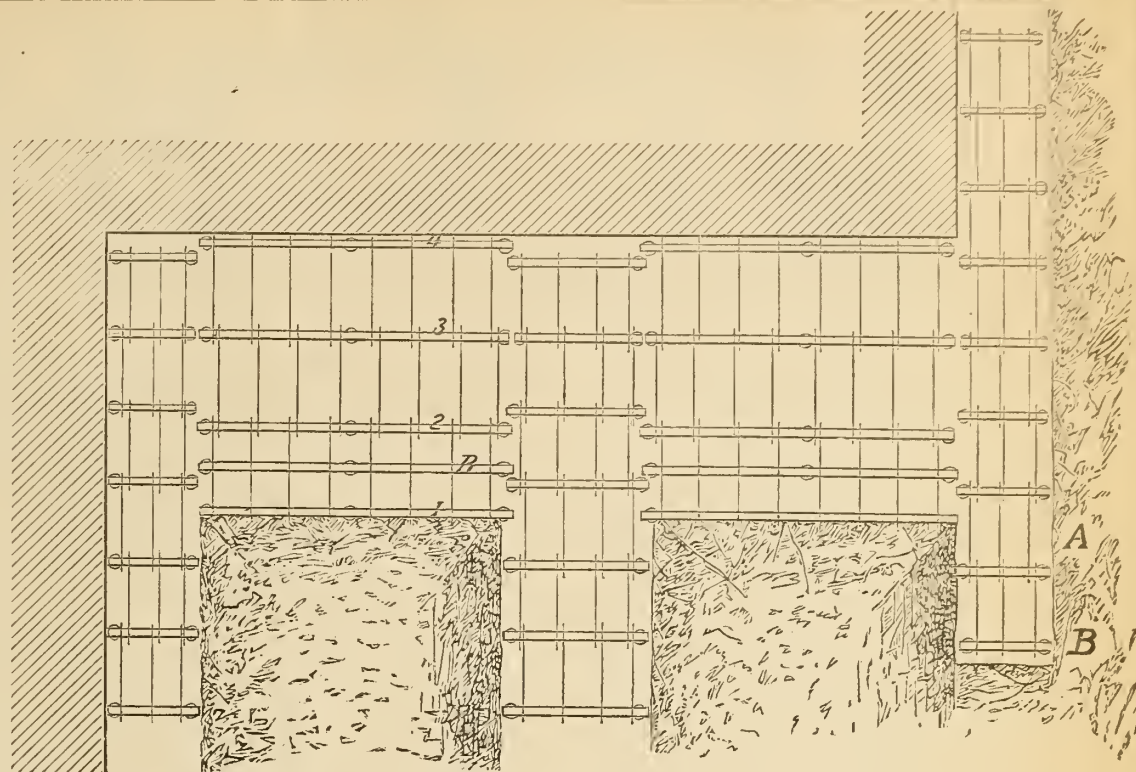


FIG. 1. SCALE $\frac{1}{100}$.

who would think of compelling the filler-up to save, at the peril of his life, an old frame, rotten, of which perhaps not one piece would be used again? Are we to imagine him working at the mouth of a blind alley, the exhausted ceiling of which no longer holds for a considerable length, save by a state of equilibrium, which would not allow of the slightest derangement? Such a work would only be carried on easily by assuring the retreat of the miner by a supplementary support sufficiently strong to bear the weight of the earth when put in motion. And what expense then would be incurred in order to draw out an amount of timber of which three-fourths would be solid per cubic metres at the pit's mouth as broken wood.

In back currents, and badly ventilated air passages, where the timber, unless it be of oak, rapidly decays, or is consumed by dry rot, we have come, as well as in heavy ground, to the exclusive use of iron for the frames and even for the casing, and there is already a great saving in the cost of repairs. But as to the stalls, no serious progress has been realized to this day. We have had the Johnson buttress, and the Anzin screw; the last named, the use of which is known, has been in some request, but its numerous disadvantages have caused it to be abandoned by its most enthusiastic admirers. It could only be used with security in light ground, free from fissures. Besides, under great pressure, and above all in beds which were somewhat inclined, the screw bent and it was sometimes difficult to draw it out again. It was not, moreover, without a liability to mislead, and as the price was rather high, this mode of support did not, in the end, produce any economy on the old system of timbering.

In certain cases they draw out as they can, it will be said, here and there, a piece of stall boarding, but what saving can that represent? Besides, except under the most minute surveillance, we believe that these arrangements are more theoretical than practical, and it is not in the filled-up stalls of Belgium that they will be followed to the letter. In the large stalls and the open spaces of English mines, a partial untimbering is done, but the object of this operation, being exceedingly dangerous as it is prac-

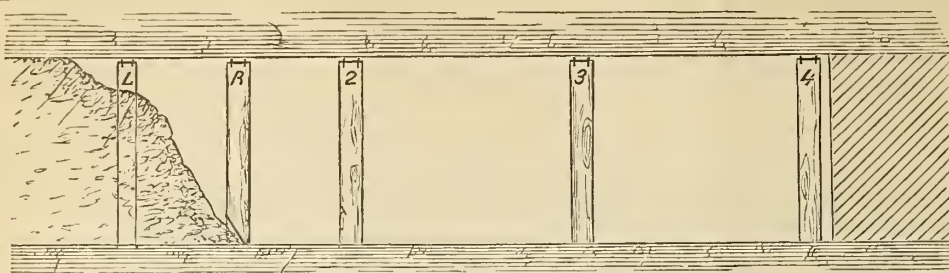
ticed, is not so much for the sake of economy as to facilitate the falling-in of the roof when it is slow in doing so. In France, in the working of thick beds by the horizontal system several special miners go over the front of the part filled in and contrive to draw out about 80 per cent. of the poles, when they are paid about 25 per cent. of their value. As for the props, which are about 2.30 metres (2) in height they are often abandoned.

M. Baily, divisionary engineer of the Compagnie de Marles, whose technical services bring him distinction by the numerous improvements that he has already introduced in mining art, has just bestowed an important benefit upon the mining industry. He has attained in, we think, a most satisfactory way, the desideratum indicated by the title of this article. The untimbering of stalls is from this time possible in almost every case, and it can be practiced with economy and security.

The importance of such a fact is evident; it has already been proclaimed in France by the mine owners and by the body of miners. With us, without doubt, the method of which M. Baily is the inventor, will be still better received if it is borne in mind that the conditions of working are much less favorable than those of most of the French basins. Many Belgian mines have a cost of output hardly inferior to the selling price, while the difference for the most favorably situated amounts at the most to 80 or 90 centimes. (3) Now, by this system of untimbering, the cost of output is lowered by 10, 20 or 50 centimes per ton. Great profit will, therefore, result not only to the owner, but also to the miner.

It is of consequence then to introduce this method in our workings as soon as possible, and it is in order to aid in doing so that we take the following description of it from the record of the Union.

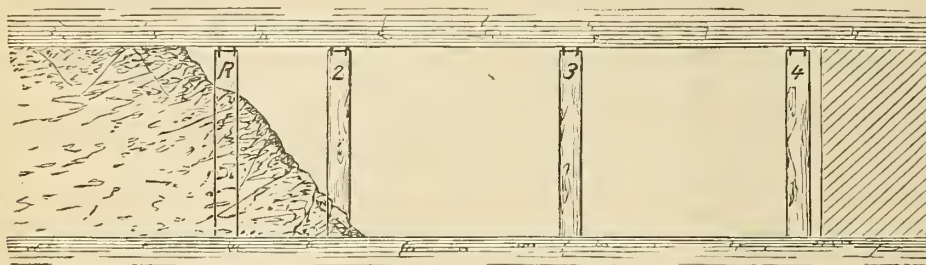
M. Baily's system of support is mixed. It is constituted of metallic lengthening bars supported by wooden props. The shape and dimensions of the lengthening bar will vary according to circumstances. However, M. Baily has arrived at a certain type which we will give further on, and which seems likely to

FIG. 2. SCALE $\frac{1}{10}$.

suit the majority of cases. In his first attempts he made use of two flat pieces of iron separated at regular intervals by a clamp, which ran through the joint-bolt. This lengthening bar was very simple and inexpensive, but it was not sufficiently rigid when placed edgewise, but easily lost its proper shape under the heavy weight of bad ground. He has since then used the cross-girder *M*, and then *I*. Finally, he has adopted the cross-girder *H* placed flatwise. The resistance of the materials seems to indicate that it would be more advantageous from that point of view to place it edgewise. Nevertheless practice favors the arrangement adopted by M. Baily. Indeed, the method of placing it flat is more easy, demands less care, and is done more rapidly. The cross-girder well wedged up to the right of the props cannot upset so easily as when placed edgewise. Under the pressure of the roof the last named often gives way, and is twisted. The making it straight again is then

upset, and the support is destroyed. By the flat position none of these inconveniences accrue. Under the pressure of the roof the projections of the lengthening bar penetrate into the head of the wood, this fitting in is so strong that it would be impossible to upset the timber transversely without splitting it throughout, and the operation of untimbering longitudinally, according to the Baily method, is sometimes only possible by disengaging the drop at the foot. The lengthening bar placed flat does not require so much height, which is an appreciable advantage in thin beds.

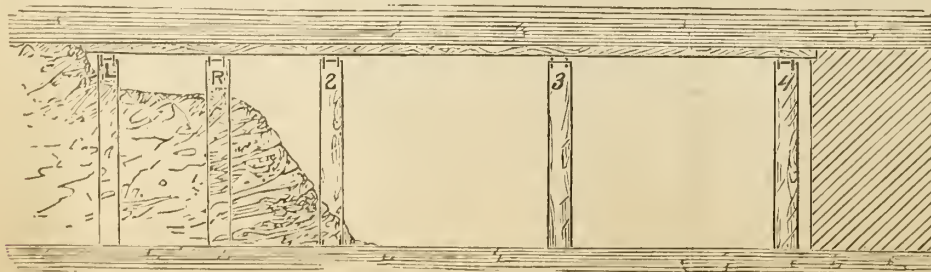
Lastly, when the pressure of the soil is too great a crack is produced to the right of the props in the two upper projections, with a detonation similar to the discharge of a gun. At this moment the resistance of the frame is still intact, and forewarned, the miners have time to strengthen the propping, or to take such other measures as are expedient.

FIG. 3. SCALE $\frac{1}{10}$.

difficult and requires it to be withdrawn from the mine. The lengthening bar placed flat is inflected in such a way that the deformation is slight, the lengthening bar is used again by turning it upside down, when its resisting power is greater still. If the curvature is too pronounced the miners themselves straighten it by grappling it between two props, and pressing on the projecting part in the way desired. If the piece is bent several times it is straightened by means of a small hand machine invented by M. Baily, which is very simple, and which, with the help of two men, will straighten twenty lengthening bars an hour. The method of placing them flat better preserves the props. It has been noticed that in galleries where the usage of old rail as lengthening bar has been introduced, the pressure of the rail often splits the wood longitudinally or carries away one of the projections between which it is held. In both cases it is

The cross girders which M. Baily usually employs are 80 by 45 millimetres, (4) and 8 millimetres in thickness. Four metres in length is considered most convenient. The lengthening bar is of No. 4 iron. Iron of good quality is essential if vexation is to be avoided. The weight is 8.75 kilogrammes (5) per metre, or 34 kilogrammes per lengthening bar, and the prime cost 1.30 fr. per metre. The lengthening bar of 4 metres is supported by three props, which are always more than 80 millimetres in diameter. The head of the prop is not embellished but sawn straight.

The Placing of the Lengthening Bar.—The setting is very easy. Two men take hold of the bar by the ends, and place it against the roof, a third man props it in the middle, then finishes alone the propping of the ends, after taking care to put good wedges to the right of the stays. The setting of the ashler pieces is done as in the ordinary system of support. In the ways and

FIG. 4. SCALE $\frac{1}{10}$.

false ways shorter lengthening bars are used, supported by two props. The lengthening bars of the way are not taken out.

The Removal of a Lengthening Bar.—The middle timber is first knocked down by striking the head of it longitudinally, or by disengaging it at the foot. The end props fall next, and both lengthening bar and props are quickly drawn out. These operations must be performed under the shelter of neighboring lengthening bars. In any case the miner will not be able to remain under a portion of roof which is deprived of support. That is a principle which must not be departed from, and which constitutes one of the rules of the method. It will frequently happen that the part of the stall comprised between the way and the ventilating pillar will correspond with the length of a lengthening bar, and the miners, in order to pull down the end props and pull out the cross girder, will place themselves under the protection of the support of the ways. If the length of the stall is such that it requires the use of two lengthening bars they will be arranged so as to leave a space between them, which the embankment will lengthen somewhat. This will receive the support of a way, and it will be untimbered when beating a retreat. If the ground is good, support in the false way may be dispensed with, the size of which is only large enough to allow the miner to work free from danger.

(To be continued.)

New Chemical and other Works at Capelton.

As many of our readers are aware considerable improvements have been taking place during the past year at the Capelton Copper Mines, owned and operated by Messrs. G. H. Nichols & Co., of New York. For the following interesting description of these operations we have to express our indebtedness to the *Engineering and Mining Journal* of New York:

Messrs. Geo. H. Nichols & Co., of 41 Cedar street, New York, who are the owners both of the Albert mines and Capelton Chemical Works, as also of the Laurel Hill Chemical and Copper Works on Long Island, showed their good judgment and their faith in these mines when, during the depression in the copper market, instead of abandoning the properties, they determined to meet the difficulties by introducing every labor-saving appliance they could, and so improving their whole plant that they would be able to continue the mining, concentration and shipping of their ores to this city at a profit, even during the most unfavourable state of the markets. This work of the entire reconstruction of their whole plant is now finished, and all the departments are running most successfully, and a short description of the new works will not be uninteresting.

The vein is being worked now from three shafts instead of one as heretofore. The shafts, which are numbered 1, 2 and 3, are respectively 800, 500 and 150 feet deep; they are all inclined at an angle of about 60° and cut diagonally through the ore chutes of the great deposit. The ore mineral is a mixture of copper and iron sulphides in a gangue of quartz and talc. Each of the three shafts has been most thoroughly equipped with first-class machinery. Numbers 1 and 2 are worked by large automatic dumping skips, operated by a 150 horse-power double drum engine, and number 3 shaft is run by an independent 50 horse-power engine.

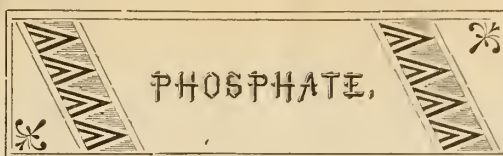
The new crushing and concentrating mill is situated exactly over No. 1 shaft, and is so connected by surface incline planes with shafts 2 and

3 that the ore from all these shafts is delivered automatically to the dressing floors, and crushed, sized and concentrated without any but mechanical handling, except at the picking tables, where boys do the actual sorting. The whole design of these works reflects the greatest credit on Messrs. Copeland & Bacon, contractors for the plant, and Mr. Earle C. Bacon, who is the consulting engineer for the company, and from whose designs and under whose direction, aided by the superintendent, Mr. Richard Penhale, the work has been so successfully carried out. The crushing and concentrating mill is run by a 100 horse power cut-off engine, supplied with steam from a battery of 400 horse-power boilers. In addition to the mill engine, these boilers supply steam for two large air compressors, an Ingersoll and a "Norwalk Compound," which supply and run 18 drills underground.

The ore coming from the three shafts is first dumped from the automatic skips on to a "grizzly," with the grates set three inches apart: below this "grizzly" is a second one with the grates set one inch apart. All the material which will not fall through the upper "grizzly" is fed direct to the large 30 by 15 Farrel foundry Blake crusher, from which the ore is discharged on to the second "grizzly" with the fines from the first "grizzly." What passes through the one-inch bars goes on down to the concentrators, but all the material between 1 inch and 3 inches is fed to an endless picking table. Boys are stationed on each side of this table and pick out the lean and barren rock. The lean ore goes to a 20 by 6 crusher and thence to two sets of 30 inch Cornish rolls and from these to the concentrators, while the clean and rich ore is discharged over the end of the travelling table and fed to two 20 by 6 crushers, from whence it drops into bins and is ready for shipment. The fines from the screens and the lean ores from the tables are conveyed to the double compartment plunger jigs, of which there are six, and the concentrates are conveyed into bins for shipment. The ore from these bins is then fed automatically again into the buckets of a wire rope tramway, which carries it down the mountain side and delivers it direct into the railroad cars, 4500 feet from the mine. This tramway, which has also proved a very great success and a source of great economy, was built by the Trenton Iron-Works of Cooper, Hewitt & Co., of New York. The capacity of the mill and tramway is 300 tons per day. The fines from the mines are conveyed by tramway to the chemical works at foot of the hill and made into sulphuric acid. This is probably the most complete sulphuric acid plant on this continent. It will thus be seen that practically, from the time the ore is first loaded into skips at the bottom of the shafts, its progress through all the different operations of sizing, crushing, separating, concentrating and transporting to railroad is entirely automatic.

Both the designing and carrying out of the whole plan is worthy of great commendation, and is an example of mechanic skill well worth examining and following by mining engineers in general.

Cost of Colliery Surveys at Westphalia.—It is stated that at the 194 collieries of the Westphalian district, during the years 1850-1 and 1882, the average annual expenditure on the preparation of mine plans and on other mine surveying operations amounted to £9,323 16s. This sum represents an average of 17 cents for every 100 tons of coal raised, or fifty cents for each workman employed.



In General.

The following shipments of Canadian ore have been made from Montreal from 18th May to June 9th, 1888:—

Date.	Ship.	Destination.	Shippers.	Tons.
May 18	s.s. Oxenholme	Liverpool	Wilson & Green..	550
" 22	s.s. Baumwall	Hamburg	Lomer, Rohr & Co	151
" 23	s.s. Durham	(City) Liverpool	Wilson & Green..	180
" 25	s.s. Washington	(City) London	Lomer, Rohr & Co.	230
" 31	s.s. Cynthia	Glasgow	" "	30
June 1	s.s. Cremona	Hamburg	" "	240
" 2	" "	do	Wilson & Green..	49
" 2	s.s. Canopus	Liverpool	" "	410
" 7	s.s. Dominion	Bristol	Millar & Co.....	37
" 8	s.s. Holstein	Hamburg	Wilson & Green..	100
" 9	s.s. Bonnington	Dublin	Lomer, Rohr & Co	310
			Total	2,536

*384 bags—30 tons.

RECAPITULATION.

Wilson & Green	1,259
Lomer, Rohr & Co.....	961
Millar & Co.....	317

Judge Burbidge will not give his decision in the case of Fraser v. The Queen for a few weeks yet.

Markets.

The British market quotations stand at 11½d., with a fifth of a penny rise.

Templeton District.

The celebrated Blackburn Mine is undergoing some improvements in its workings and is producing a steady output of first class mineral. A large quantity of ore has been shipped since the season opened.

Messrs. Gillespie & Patterson will shortly resume operations on their property.

The Templeton and Blanche River Company's main shaft has reached a depth of eighty feet, where a well defined vein is yielding rich ore, and gives most promising indications as the workings increase in depth.

Kingston District.

Captain Boyd Smith arrived in New York from Great Britain on 2nd instant. A good force is working the Blessington and St. George's Mines, and the output is most satisfactory. At Blessington one of the shafts is yielding a very good iron ore. Every preparation has been made for extensive operations during the summer. A large number of new shows have been opened. A shipment of 200 tons will be made in a few days from the St. George's Mines to Philadelphia.

Du Lievre.

The shipments from the High Rock Mines continue very large, something over 1,500 tons having been shipped during the past month. This company is building a freight shed at Buckingham landing. On Monday, the 11th, 55 tons of high grade ore was taken out of No. 11 pit, the result of one blast. How is this for a record?

The Dominion Mining Company have an immense quantity of phosphate at their landing place ready to ship; their shipments will probably amount to 4,000 or 5,000 tons this season. It is believed that this company will re-open their workings at the "Lansdowne" Mine, adjacent to Mr. S. P. Franchot's property.

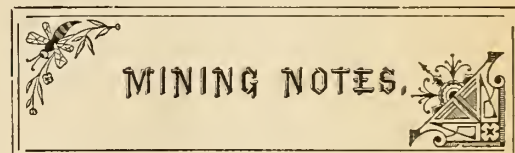
The Canadian Phosphate Company's output for the week ending 16th instant was close upon 150 tons. Captain Smith proposes to put a new steamer on the river to facilitate the moving of his company's output.

A party named Carriere has eight or nine men working a phosphate find in the vicinity of Donaldson's Lake, and claims that it is in the interests of an American firm located at Chicago. Nothing wonderful has turned up in the way of discoveries so far. There seems to be a little mica intermixed, but it is all small stuff, and black at that. Felspar occurs here and there.

The grinding mills at Seabury are busy again. Mr. Hunton, the manager, reports that 100 tons of 60 per cent. are being ground for the High Rock people, to be distributed in the United States. The North Star Mines are also having a similar quantity crushed for the new chemical works of Messrs. G. H. Nichols & Co., at Capelton.

A number of new openings at the Emerald give excellent promise of good returns.

At the Little Rapids Mines two new openings on the east side of the hill have met with good results, while the drifts between the shafts "A" and "B" expose a mass of very rich ore. The owners of this property will continue exploration and development for a few months longer, when the extraction of the mineral for the market will begin in earnest. Judging from a recent inspection, there must be several thousand tons of phosphate now in sight.



We shall be greatly obliged to mine owners and superintendents for such authentic reports of their operations as may concern shareholders and the public.

Nova Scotia.

Reports from Halifax state that John R. Bothwell of New York has interested several New York capitalists in the purchase of a number of Cape Breton coal companies, which are to be consolidated into one management. Among the companies selling to the syndicate are the Sydney & Louisburg Coal and Railway Company, the International, and the Caledonia Company. It is also likely that a number of collieries now owned in Halifax will be taken into the consolidated company.

A new 15 stamp water mill constructed by the Truro Foundry Company has been put in operation at the Moose River Mines and gives every satisfaction. Mr. Touquoy has a large quantity of quartz ready for the crusher, and as a result of 4½ days' work with the new mill secured a bar of gold weighing 80 tons of quartz.

At the Lake Lode Company's properties in the Caribou district 106 ounces of gold were got for the first fortnight's crushing in May, and it is thought that 100 ounces more has been obtained up to the 1st of the present month. The leads are now yielding quartz well filled with coarse gold.

The opening of navigation has not been productive of steady work at some of the Pictou County Collieries. At the Dunsmuir mines there has been much idle time, owing, it is said,

to an insufficiency of vessels to carry the coal to Montreal. It is a pity that this should be so, as no expense has been spared preparing for a large output, and the management is now in a better position to fill orders than it has been for a long time past. In one day, recently, no less than 1100 tons of coal were shipped from these mines. Operations have been resumed in the No. 4 slope, giving employment to between 30 and 40 men and boys.

The Black Diamond Mine is still working steadily, doing a local trade. The output though not large is steadily increasing. More machinery for the further development of this mine is expected shortly.

Messrs. Russell and Fraser, along with Alex. Purvis, late underground manager at the Drummond Colliery, are prospecting in the neighbourhood of Westville, and it is reported that they have discovered a seam of coal. Nothing definite is, however, yet to hand to confirm the report.

At the Albion mines, the Acadia Coal Company continue to push vigorously the opening of some of their valuable properties. In the new slopes, which have been closed since the explosion in January last, extensive explorations have been made with very encouraging results, and the opening of at least one of these slopes may be looked for in the near future. The sinking of the new slope to the Cage Pit seam has been much impeded by a "step," but this has now been got through and the working goes on as hitherto. The draining of the Flood Pit, although frequently interrupted, continues, and the bottom of the shaft will soon be reached when pumping will have to be resorted to before much further progress can be made.

Notice is given by the Commissioner of Works and Mines that on the 5th day of July he will declare forfeited a number of gold mining leases in the 15 Mile Stream district, unless it can be shown that the requirements of the law have been complied with. This is as it should be.

A gold brick valued at \$2,000, the result of three weeks work, has lately been sent by the Egerton Gold Mining Company to the Glasgow Exhibition.

A destructive fire at the East Rawdon Gold Mines, on the 12th instant, destroyed thirty buildings, including seventeen dwellings, store, the company's office and store room, and the crusher and hoisting gear. The loss is estimated at over \$30,000.

The following are the official gold returns so far received at the Mines Office for the month of May:—

District.	Mill.	Tons Quartz.	Oz. Gold.
Dar's Hill, ...	Duffell Mining Co. . . .	875	376
Oldham, ...	Oldham United	68	39
Lake Catcha, ...	Oxford	115	158½
"	J. Anderson	1	78
Shebrooke, ...	Stonmont	112	263

A meeting of the shareholders of the Amherst Coal and Mining Company was held at the mine on the 12th. S. H. Holmes, D. L. Patrick, D. J. Patrick and Wm. Patrick were elected Directors for the ensuing year; William Patrick, elected Secretary and General Manager; and F. B. Robb President. The meeting of shareholders stands adjourned until 26th instant.

New Brunswick.

Major Markham has completed arrangements for continued operations at his Manganese mines pending a settlement of the estate of Messrs. W. C. Pope & Co., and the mines have accordingly been reopened and work resumed.

The annual meeting of the Westmoreland and Albert Mining and Manufacturing Company was recently held in Moncton, N.B., at which Mr. H. R. Emerson was elected president, and Mr. E. B. Chandler was re-elected secretary. The property of this company is situated at Rockland, N.B., and consists of oil and shale works. It is understood that negotiations are pending which will probably lead to the active working of the property by American capitalists. The company has been reorganized with this end in view and to complete the negotiations.

The work of prospecting in New Brunswick is steadily going on in different counties, principally in Albert, Kings, and some others. New finds are being continually brought to light, and several new deposits of manganese have been discovered in Kings and Albert Counties.

Amongst the mines that are at present being worked is the New Brunswick gold and silver mine, in King's County, about 8 miles from Waterford. The ore is silver and copper, and the width of the vein at the surface is 30 feet, with well-defined walls. There are other veins on the property, and with the careful outlay of capital it should prove a paying investment.

Quebec.

We have to acknowledge a first-rate specimen of clear amber mica from Mr. H. A. Church's property near Chelsea.

Extensive mining operations are being successfully carried on this season at the Beauce gold fields. Recently a nugget weighing 8½ ounces and valued at \$124 was, with much coarse gold, taken out of a claim recently opened on the River du Moulin, about one mile from St. Francis Church.

Ontario.

By the explosion of two torpedoes in the 500 foot gas well shaft of the Collingwood Rock Well Company at Collingwood on the 1st inst., the flow of gas was increased. There are indications of the presence of gas in West ward also, and the company is going to sink a shaft there.

The Canada Copper Company's mines at Sudbury are developing nicely and producing a satisfactory output. A number of new buildings are in course of erection at the mines.

Mr. J. B. Miller is reported to have made a rich discovery of silver in the Sudbury district. Specimens assayed by Mr. Willmet, of Sault Ste. Marie, gave 182 ounces of silver to the ton.

Col. Robert Hill, A. C. Buell, J. B. Kirk, A. N. Young, E. H. Reed and Volney W. Foster, Chicago capitalists directly interested in the Denison gold finds, paid a visit to their property during the month. On their return to Sudbury a company was organized under the title of the Vermillion Mining Company of Ontario (under the Joint Stock Companies Act) with a capital of \$240,000. All the capital is allotted, half of it being given for the property.

One assessment of five per cent. has been made. The following is the Board of Directors: B. E. Charlton, of Hamilton (President), A. G. Duncan, of Sudbury (Vice-President), John Oliver, of Chicago, (Secretary-Treasurer), Robert Hill, of Chicago, E. H. Reed, of Chicago, Henry Ranger, of Sudbury, and V. W. Foster, of Chicago. At the mines, which are superintended by Mr. A. G. Duncan, a number of buildings for the accommodation of the men have been erected. Thirty men are at work, and a small three stamp mill is kept running night and day. The company own 2,800 acres.

The Orillia News-Letter continues to hold out the promise of the existence of coal in that neighborhood, and calls on public-spirited citizens to assist in ascertaining the truth. Over \$600 has been subscribed by a few persons to make the test; they are asking the people of the town to make up another \$600. Just what the reasons are for making the assertion that a bed of coal underlies the County of Simcoe we cannot say other than that an expert, a native of the county, who has wide experience elsewhere, has made a surface examination and found good indications.

At the annual meeting of the K. & P. Railway and Mining Company, held recently, the following officers were elected for the ensuing year:—Henry Sibbett, of Brooklyn, president; B. W. Folger, vice-president; D. L. Gibbons, secretary and treasurer; and a board of directors composed of the following: Henry Sibbett, Brooklyn; F. S. Flower, W. E. Cooper, D. L. Gibbons, H. S. Hollister, New York; W. G. Pollock, Cleveland; W. R. Stirling, Chicago; and F. A. Folger, Kingston. A statement presented showed the available assets to be \$90,000, and for the past year on mining operations, \$10,000 net profit was realized. No dividend was declared. Several American firms have asked to be supplied with the ore, and one of them, the Carnegie Bros., of Pittsburg, have asked for 500 tons per day.

The attention of mine owners and operators, quarrymen, and managers of reduction or manufacturing works, is directed to the advertisement in another place, regarding the Centennial Exposition to be held at Ohio from July 4th to October 27th. Every effort is being made by Mr. Blue to have Ontario's mineral wealth represented by a first-class exhibit, but he cannot very well do this unless he receives the hearty co-operation of all in any way interested in the growth and advancement of the mineral wealth of the province. At present there is every indication that the Ontario exhibit will be large and varied, and we trust our readers will assist him in this undertaking as far as possible by sending their private collections of minerals, or by sending specimens from their mines. Such an exhibit cannot fail to do good to the mining industry of the province.

We have received a copy of the prize list, just issued, for the Tenth Industrial Exhibition, to be held in Toronto from the 10th to the 22nd of September next. Any of our readers, who may think of sending contributions to the mineral exhibit, for which an excellent prize list is provided, can readily obtain a copy of the printed list by dropping a post card to Mr. H. J. Hall, the Secretary, at Toronto. The prospects of the success of this year's exhibition are very promising.

At the Bristol Iron Mines the engineers have started work on the short line of railway necessary for the development of the property. Mr. Hiram Robinson, one of the Directors, is confident that everything will be in good working order at an early date. New calcining furnaces will also be put in operation.

Re Cartier gold discoveries our correspondent writes: "I have made enquiries in this matter and find that a man named Joseph O'Harze, living at Larchwood, has found gold and silver in the vicinity of Cartier Station, and I understand the find to be important. I believe that parties willing to invest capital in mining in this district can secure some good locations with every prospect that they will turn out remunerative. At all events the district here will bear inspection. There are a good many prospectors out now and capitalists have experts in the field. It is said that some of the properties will shortly be taken up by English capitalists."

Manitoba and North-West Territories.

Not the least interesting portion of Mr. J. B. Tyrell's report on the region of Northern Alberta is the chapter on economic minerals. Regarding the coals and lignites he writes:—"The enormous deposits of coal and lignite that underlie an area of more than 12,000 square miles in the western part of this district must be considered as first in value and importance among its economic minerals." The only true bituminous coal yet found within the district is that outcropping in the neighborhood of Bow River. On the north side of that river only one seam—two feet ten inches thick—was observed. If the thickness of the coal on the south side be taken as seven feet and the dip be assumed to decrease gradually to the eastward, the seam would contain about 9,500,000 tons to the square mile. There is reason to believe that the bed extends north and south of the known outcrops for many miles. Nearest in character to the bituminous are the lignitic or semi-bituminous coals found on the Red Deer river at the eastern edge of the foot hills. There is an irregular seam at the Rocky Mountain house varying from 8 to 2 or 3 inches thick. Probably other and thicker outcrops may be found in the vicinity. There is an important seam in the North Saskatchewan above the mouth of Buck creek, which in one place is fifteen feet thick. The area may be underlain by some 140,000,000 tons of lignite coal. Another area yields probably 150,000,000. All through the Edmonton series in fact there are seams of greater or less extent, many of which will be opened as the country becomes developed. Compared with American coal, the quality of our Northwest lignite can hold its own. Many samples from the seams above mentioned may be favorably compared with these of eastern America, while generally they are quite equal to those of Colorado, Wyoming and other western states.

The output of coal from the Lethbridge Mines for the month of May was close upon 500 tons per diem.

The Local Legislature of Manitoba offers to loan to the C.P.R. \$7,500 per mile, so that the company may experience no difficulty in extending their Southern and South Western branches into the Souris District. The completion of these lines would undoubtedly prove of much benefit to the province in the opening up of the large coal deposits of the Souris River. This coal is of very good average quality and is suitable for general use

and for steam purposes. One great fault, however, is the large amount of hygroscopic or contained water which greatly exceeds that found in bituminous coal, and which causes the lignite to slack and crumble to some extent on exposure to the atmosphere. Another is the percentage of ash, which is greater than that contained in higher grades. Practical men, however, contend that both these faults can be largely counteracted by improved methods of preparing the coal and by alterations on existing stoves and grates. The coal burns well, gives a good strong heat, and can be laid down cheaply throughout the province. The development of these deposits will prove of immense value to this comparatively treeless province.

Operations at the gold mines of the Lake of the Woods has been commenced.

H. G. McMicken, Winnipeg, has just returned from his gold location, seven miles east of Rat Portage. He and his partners have put up a house there; have a gang of workmen; and drilling outfit on the spot. They have traced some very fine leads right across their property, and are getting out several car loads of ore which they will ship to Omaha next week to have it reduced and its exact value determined. So far all they had to go on was a number of assays which resulted very favourably.

The Dauphin Oil Company has been formed in Winnipeg to work the petroleum said to have been recently discovered in the Riding Mountain District, north of Minnedosa. A board of seven directors consisting of the following gentlemen were elected: Dr. Clark, C. Stewart, C. F. Brown, T. G. Mathers, T. G. Moore, C. O. Wichenden, F. H. Schofield, A. R. Anderson, W. L. Harrison and W. P. Johnston. Mr. Case, an expert with twelve years experience in the Pennsylvania oil regions and four years in Ohio, states that he examined the district in winter and traced the oil by the discoloration of the snow. Whenever the snow was discovered, the ground underneath was not frozen, a fact which is quoted as a sure indication that oil was present in large quantities. It is further stated that there are better indications of oil on the surface in the Lake Dauphin district than could be found 200 feet below the surface in Pennsylvania, and that the shale exposed on the sides of the hills by land slides was so saturated with oil that it could be ignited with a match and would burn freely. The surface oil, which is said to have been struck, is on top of a rock bed, and the rock will have to be bored to reach the genuine or rock oil. The new company has resolved to make application to the Legislature immediately for letters patent of incorporation under the provisions of the Joint Stock Companies Act. The capital stock has been placed at \$100,000, divided into shares of \$25 each.

The Manitoba Oil Company, which owns property in the same district, has decided to resume operations this month.

Mr. George Bradford, M.E., of London, England, passed through Ottawa during the month on his way to the North-West, where he will examine and report to an English syndicate on the coal deposits of that region.

British Columbia.

E. A. Mackenzie & Co., of Jamieson Creek mines, some twenty miles north of Kamloops, have bonded their property to a California

syndicate, who have agreed to expend between \$3,000 and \$4,000 on the property within ninety days. If the syndicate desire to purchase the property at the conclusion of the option they have agreed to pay to each of the three owners the sum of \$15,000. The ore looks well and the prospects are encouraging.

The *Colonist* is our authority for the following from Illecillewaet—Corbin & Kennedy are breaking the trail over the mountain, and expect to be running their pack train bringing out ore in about a week. It is quite improbable that the wagon road up the North Fork will be attempted as the appropriation is only \$3,000, and the government ask that seven miles of road be completed before they will give this amount. The cost of these seven miles will be at least \$7,000.

McGillivray & Co. are working upon the Silver-tip mine, and report a well developed vein, with ore of the same class as the Lanark.

The Selkirk Co. will soon have their pack train running and shipping several tons of ore daily.—The Lanark looks splendidly, large deposits of ore showing up in different portions of the mine.

The Hon. Robert Dunsmuir states that four shafts are at present being sunk on his New Comox mines:—The prospect shaft on the eight-foot seam is being widened for the purpose of making it an air shaft. There is a great deal of work to be done, and it is doubtful whether coal will be shipped this fall or not. The line is graded for several miles, and its whole length will be ready for the rails by the time they arrive from England.

The Nicola Mining Company's shaft is down 153 feet, the ore body at that point being 3½ feet in width, the quality improving as depth is attained. The ore carries more gold than silver, averaging about \$60 to the ton of the former and 25 ounces of the latter. It is the intention to sink to a depth of 200 feet.

The President of the Hamilton Powder Company has been in Vancouver, and, with characteristic enterprise, has decided to erect a magazine for their business at a point a few miles from Hastings. The C. P. R. has agreed to construct a switch to the magazine from the main line, which will facilitate the receipt and delivery of their explosives.

The Mount Ceniz tunnel, the property of the Perry Creek Gold Mining Company, has been driven in anew about 400 feet, and it takes only 100 feet more to reach the face of the canyon which impeded the old working. The Kootenay pioneer, Mr. W. Fernie, who originally opened this tunnel, gave his opinion only a few weeks since that as soon as the rock is reached enough gold will be taken out to pay expenses, and after getting through the canyon a very big find may be expected.

The British Columbia Smelting Company (limited) has been registered in London, England, with a capital of £65,000, divided into 65,000 shares of £1 each, for the purpose of carrying on the business of miners, and to win, get, mine and work ores, minerals and metallic substances and compounds of all kinds, smelters, refiners, and dealers in bullion, metal, and other products of smelting.

The mining season at the various camps is being turned to account with great spirit. The extent and character of the minerals are now thoroughly known and it only requires the presence of the requisite facilities in the shape of smelters, to create a new era for the province. A great deal of discussion is now going on as to the proper localities for the reducing works, a point which outsiders would suppose to be easily settled. If smelters are to be erected in this province, they should be as near as possible to the place where the ore is taken from the mine. The mere site of the smelters, so far as surrounding conveniences are concerned, is a very secondary affair; the chief requisite is shortness of carriage from the mine to the smelter.

Latest advices speak highly of the outlook of the Lanark mines, Ill-cillewaet. The work performed during the winter and spring has uncovered a very rich body of ore. A tunnel has been run lengthwise upon this ore body, extending about 115 feet, with a width of 8 to 25 feet, and a depth of 20 feet, proved, and probably 15 or 20 feet deeper. Ninety feet below this a second tunnel has just struck the same body, but narrower. It seems to widen out as the body goes into the mountain. Still lower, at a further depth of 150 feet, the contact vein with narrower veins of galena, has been discovered cropping out on the surface, and a third tunnel will probably soon be started to explore this depth. Mr. Tilton, the superintendent of the work, is now preparing to ship ore, and hopes in a week or two to be shipping five tons per day of first-class ore. With the number of animals at present available by the company, about 40, there is much more ore in sight than they can pack out during the summer. The yield of this galena ore is perfectly uniform—and the result of the season's work will astonish those who have no faith in *results* in British Columbia mines. It is very satisfactory to the company to know that every extension of the underground work exposes large deposits of paying veins. Several English and American experts are expected at the mines this summer to watch the smelting, and it is thought they will invest their money in the enterprise.

Something About Explosives.—All quarries have a certain amount of covering which must be removed before the stone can be taken out. This deposit is either a part of the stone which has become disintegrated by the

weather or is a later deposit. The first consideration in removing this deposit, or "stripping," and in forming a quarry face, is to get the broken stone out of the way as quickly and cheaply as possible regardless of its size. For this purpose no especial skill is required in the management of the explosive, but for breaking rock which is to be used, much skill and knowledge are required in order to reach the best results. Furthermore, a knowledge of the particular stone which is being worked is necessary. Every quarry has its peculiarities and must be worked according to the best method for that peculiar stone.

The use of a sudden explosive, like dynamite, is to be avoided. The effect of such explosives is to shatter the stone in many directions, as does a blow from a hammer. Coarse gunpowder is better. Repeated light charges of powder covered with sand are much better than heavy charges tamped in tight. A rock may be detached without breaking by means of often repeated light charges, which would be badly broken were a single heavy charge strong enough to detach the rock employed. Where a heavy charge is employed the shape of the bottom of the drill hole influences the direction in which the rock will split to a greater extent than does the rift. When light charges are used, the bottom of the drill hole influences the direction of the breakage, but to a less extent. Much rock has been wasted through a lack of knowledge on this point. If one examines the bottom of a drill hole which has been made with a steel bitted percussion drill, it will never be found round, and a hole made with a hand drill is always triangular at the bottom. A charge will ordinarily break the rock in three directions corresponding with the shape of the bottom of the drill hole. In the sandstone quarries of Portland, Conn., they have controlled the blast very successfully by the use of the following device:

Deep holes from ten to twenty or more feet in depth are drilled with a diameter of ten to twenty inches. These holes are made by machinery, and the direction of the blast is determined by placing the charge of powder in cannisters of tin, shaped according to the kind of blast required. These cannisters are placed in the drill holes and tamped in with sand so that the effects of the blast are the same as though the holes were the shape of the cannister. Where a break across in a straight line is desired, the cannister is made of two pieces of sheet tin, the edges being left unsoldered and the ends covered with paper or cloth. A horizontal cross section would show the cannister bounded by two minor segments of a circle. The blast is

in the direction of a plane passing through the edges of the cannister. Where the shape of the blast is not considered a great waste of rock necessarily follows.

In most quarries where the shape of the rock is to be considered, powder is only used to detach large pieces which are further worked up by means of wedges. The drill hole is put down to the depth to which the rock is to be broken and light charges of powder are employed. Afterwards a heavy charge is employed which forces the block forward. As every rock has a different structure, the direction of cleavage planes influences the management of the blast. There must be at least one free end to allow the rock to move out to the face. Where the ends are cut off by natural joints they are called "end joints;" horizontal joints, called "bottom joints," are more common.

It sometimes happens that the bottom joints occur only at great intervals. The Penryn quarries, in California are of this kind. Here they cut an underblast along the first bottom joint from one end joint to another. A line of lewis holes is put down 15 or 20 feet from the face and the blast breaks out the block between the joints and down to the bottom joint which is about eighty feet from the top. Such blasts act more like wedges than ordinary blasts and are capable of breaking off blocks containing 100,000 cubic feet of stone.

For quarrying sandstone in the larger quarries powder is not often used. Granite is less liable to be injured by the use of explosives than softer stone, but even in quarries of this class of stone, blasting is not often used except for detaching large blocks which are removed by other means.

Deep Boring for Coal.—The deepest bore-hole in the world is said to be at Schladenbach, near Kottchau Station, on the railway between Corbetta and Leipsic, and has been undertaken by the Prussian Government in search for coal. The bore-hole, which in January, 1885, had reached a depth of 4,600 feet, was commenced in June 1880, but left after a years work, recommenced at the end of 1882, and is still progressing.

Chlorination of Zinc Ores.—The Iron Silver Mining Company, of Leadville, Colo., has entered into a contract with the Omaha & Grant Smelting Company for the erection of a plant in connection with the latter company's works, to extract the zinc from the ores mined by the Iron Silver Company. The process is an experiment, the success of which will be of immense importance to Leadville. It will

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consist of a partial roasting of the ore for desulphurizing, and then an application of electricity to a chlorination process, which will precipitate the metallic zinc and leave the residue a free smelting ore. It is the application of Plattner chlorination to zinc instead of gold ores.

Slag Fertilizers.—The manufacture of basic slag manure is proceeding steadily, and a much larger market might be found for steel-works' waste if greater quantities could be readily ground. The Staffordshire Steel Company have now three grinding mills at work turning out 200 tons per week, and the heavy stock which was laid in during the autumn months is now going off rapidly to the order of London fertilizing contractors. The selling price to the local agriculturists is 40s. to 45s. per ton, as against 55s. or 60s., which has to be paid for phosphates.

- (1) 1 franc = 19.4 cts. U. S. currency. (2) 1 metre = 3.281 ft.
(3) 1 centime = 1.94 cts.
(4) 1 millimeter = .0394 inches.
(5) 1 kilogramme = 2.2046 lbs. Avoird.

FREE ADVERTISING.

Mine Owners and Operators, Contractors and the heads of other business undertakings requiring working plant or machinery can have their wants made known in this column free.

Inquiries from Employers in want of Superintendents, Engineers, Metallurgists, Chemists, Mine or Furnace Foremen, Engineers or assistance of this kind, will be inserted without charge.

WANTED—Situation as Foreman Engineer at Mines. Sixteen years experience erecting, repairing and running Hoisting, Pumping and Air Compressing Engines and machinery. Would undertake in connection with above, the duty of Time and Storekeeper or Outside Overman. References if required. Address "Engineer," office of THE CANADIAN MINING REVIEW.

WANTED—SMALL SECOND-HAND STEAM PUMP for Phosphate Mines. Write with full particulars to "T," THE CANADIAN MINING REVIEW Office.

THE SUBSCRIBER begs to inform those interested in Mining Properties that he is about to go to England, and will be glad to effect sales of any properties that are really good, having unequalled facilities for disposing of same. FRED. J. PENFORD, Coaticooke, Que. Cable Address, Ouvrage, Folkestone, or Folkestone, Kent, England.

Trustee's Sale.

Anthracite Coal Lands.

To settle controversy among parties in interest I will sell to the highest bidder at public sale, at my office in St. Paul, Minnesota, on the 22nd day of June, 1888, at 11 a.m., 1,240 acres of anthracite coal lands, located about one mile from Canmore Station, on the Canadian Pacific Railway, Province of Alberta, described as follows:—

The NE $\frac{1}{4}$, NE $\frac{1}{4}$ of NW $\frac{1}{4}$ and NE $\frac{1}{4}$ of SE $\frac{1}{4}$ of section twenty (20), the W $\frac{1}{2}$ of NW $\frac{1}{4}$, SE $\frac{1}{4}$ of NW $\frac{1}{4}$, SW $\frac{1}{4}$ and W $\frac{1}{2}$ of SE $\frac{1}{4}$ of section twenty-one (21), the N $\frac{1}{2}$ of NE $\frac{1}{4}$ and SE $\frac{1}{4}$ of SE $\frac{1}{4}$ of section thirty (30), and the W $\frac{1}{2}$ of NE $\frac{1}{4}$, SE $\frac{1}{4}$, NE $\frac{1}{4}$, NW $\frac{1}{4}$, E $\frac{1}{2}$ of SW $\frac{1}{4}$ and SE $\frac{1}{4}$ of section thirty-one (31), all in township twenty-four (24), range ten (10), west.

Terms: one half cash within thirty days, remainder in two equal annual payments with 7 per cent. interest.

A deposit of 10 per cent. required at the time of sale. This is the best block of coal lands in the Bow River Valley. For further particulars address

E. F. DRAKE, Trustee,
St. Paul, Minn.

WARNER'S SAFE CURE

ST. CATHERINES, Ont., Jan. 24th, 1887.—About six years ago I was a great sufferer from kidney disease, and was in misery all the while. I hardly had strength enough to walk straight and was ashamed to go on the street. The pains across my back were almost unbearable, and I was unable to find relief, even temporarily. I began the use of "Warner's Safe Cure," and inside of one week I found relief, and after taking eight bottles, I was completely cured.

W. E. Hugg

Manager for American Express Co.

THE GREATEST

CHATHAM, Ont., March 6, 1888.—In 1884 I was completely run down. I suffered most severe pains in my back and kidneys, so severe that at times I would almost be prostrated. A loss of ambition, a great desire to urinate, without the ability of so doing, coming from me as it were in drops. The urine was of a peculiar color and contained considerable foreign matter. I became satisfied that my kidneys were in a congested state and that I was running down rapidly. Finally I concluded to try "Warner's Safe Cure," and in forty-eight hours after I had taken the remedy I voided urine that was as black as ink, containing quantities of mucus, pus and gravel. I continued, and it was not many hours before my urine was of a natural straw color, although it contained considerable sediment. The pains in my kidneys subsided as I continued the use of the remedy, and it was but a short time before I was completely relieved. My urine was normal and I can truthfully say that I was cured.

J. M. Oode

Regulates Every

GALT, Ont., Jan. 27, 1887.—For about five years previous to two years ago last October, I was troubled with kidney and liver trouble, and finally I was confined to my bed and suffered the most excruciating pain, and for two weeks' time I did not know whether I was dead or alive. My physicians said I had enlargement of the liver, though they only gave me temporary relief. Hearing of the wonderful cures of "Warner's Safe Cure" I began its use, and after I had taken two bottles I noticed a change for the better. The pains disappeared and my whole system seemed to feel the benefit of the remedy.

And Prevents and

Which are Caused by Uric Acid (Kidney)

WARNER'S SAFE CURE!

SAFE CURE

TORONTO, (18 Division Street,) Sept. 17, 1887.—Three year ago last August my daughter was taken ill with Bright's disease of the kidneys. The best medical skill in the city was tasked to the utmost, but to no purpose. She was racked with convulsions for forty-eight hours. Our doctor did his best and went away saying the case was hopeless. After she came out of the convulsions she was very weak and all her hair fell out. The doctor had left us about a month when I concluded to try "Warner's Safe Cure," and after having taken six bottles, along with several bottles of "Warner's Safe Pills," I saw a decided change for the better in her condition. After taking twenty-five bottles there was a complete cure. My daughter has now a splendid head of hair and weighs more than she ever did before.

Mrs. J. S. Burns

BLOOD PURIFIER.

296 McNab St. North, HAMILTON, Can., Nov. 2, 1886.—I had been suffering for over twenty years from a pain in the back and one side of the head and indigestion. I could eat scarcely anything, and everything I ate disagreed with me. I was attended by physicians who examined me and stated that I had enlargement of the liver, and that it was impossible to cure me. They also stated that I was suffering from heart disease, inflammation of the bladder, kidney disease, bronchitis and catarrh, and that it was impossible for me to live. They attended me for three weeks without making any improvement in my condition. I commenced taking "Warner's Safe Cure" and "Warner's Safe Pills," acting strictly up to directions as to diet, and took thirty-six bottles, and have had the best of health ever since. My regular weight used to be 180 lbs. When I commenced "Warner's Safe Cure" I only weighed 140 lbs. I now weigh 210 lbs.

M. S. Furlong

Bodily Function

I have continued taking "Warner's Safe Cure" and no other medicine since. I consider the remedy a great boon, and if I ever feel out of sorts "Warner's Safe Cure" fixes me all right. I weigh twenty pounds heavier now than ever before.

John Gruel

Inventor of the Maple Leaf Lance-tooth Cross-cut saw.

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AND OTHER

Mineral Lands

FOR SALE,

IN THE TOWNSHIP OF BUCK-
INGHAM, COUNTY OF
OTTAWA.

1st.—Lot 28, in the 6th range, containing 100 acres, in addition to the salina of the lake.

2nd.—North half of lot 23, in the 5th range, containing 100 acres.

3rd.—Nine acres of lot No. 28, in the 5th range, with water privileges thereto appertaining, being site of mill dam, etc., etc.

The property formerly belonged to the Montreal Plumbago Mining Company, and was worked successfully for several years, until the company's mill was destroyed by fire, but the mill dam remains almost uninjured, and there are on the property several houses, sheds, etc., built for various purposes when mining operations were carried out.

The Plumbago Deposits

upon the property are regarded as amongst the richest and most extensive in the Dominion. As to the quality of the Plumbago, it has been extensively used in the manufacture of crucibles, lubricating leads, stove polish, etc., and given unbounded satisfaction. This is established by the experience of consumers, and by a certificate from the celebrated Battersea Crucible Works, London, England, a copy of which is open for inspection.

MICA

has also been discovered in quantities.

The lands are in the Phosphate region, and recent prospecting has disclosed a rich and extensive deposit of this mineral. There are unrivalled facilities for transporting the ore to and from the mines by the Ottawa River and C. P. Railway. Distance from mines to Fairway Station 6 miles. Good road.

All that is required to make these valuable mines handsomely remunerative is a little capital and enterprise.

The Title is Indisputable.

For information apply to

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FOR SALE. VALUABLE Copper Mining Properties

— IN THE —

Eastern Townships

TOWNSHIP OF ASCOT.

- 1st. Clark Mine, Lot 11, R. 7 Ascot 187 acres
- 2nd. Sherbrooke Mine, part Lots 12 and 13,
R. 7 Township of Ascot..... 329 "
- 3rd. Belvidere Mine, part Lots 9 and 10, R.
9 and 10, R. 8 Ascot 292 "
- 4th. Mining Rights in same vicinity on.... 250 "

All of the above properties lie within 1½ miles of the Village of Lennoxville, at the junction of the Grand Trunk, Canadian Pacific and Passumpsic Railways, and have been developed to a considerable extent, and veins opened 6 to 20 feet in width, yielding 3 to 5 per cent. of copper, also silver, and 35 to 40 per cent. of sulphur. These mines are only 2½ to 3 miles distant from the City of Sherbrooke, and evidently are of the same class of ores found at Copelton, only four miles distant, owned and worked by the Orford Copper and Sulphur Company, and by Messrs. G. H. Nichols & Co., of New York, which have proved so remunerative.

TOWNSHIP OF ORFORD.

- 5th. Caribuncle Hill Mine, Lots 2 and 3 R. 14, and
2, 3, 4 R. 15, 718 acres. Same class of ore as is found
in the Ascot properties above described, but yielding a
higher percentage of copper.

TOWNSHIP OF CLEVELAND.

- 6th. St. Francis Mine, ¼ Lot 25 R. 12, 50 acres, with
dwelling houses, smith's shop, ore sheds and office, large
winding and pumping steam engine, with boiler, winding
and pumping gear, and about forty fathoms Cornish lifting
pumps complete, railway tracks, ladders, etc., situated
three miles from Grand Trunk Railway. A considerable
amount of mining work has been done at this mine. A
well defined vein richly charged with vitreous purple
and yellow sulphurets of copper traverse the entire
length of the property, five feet in thickness, yielding 8
to 40 per cent. metallic copper.

TOWNSHIP OF GARTHBY.

- 7th. Fifty-six lots of land, 2,938 acres. This prop-
erty for the most part is unexplored, but copper is found
on the greater part of the property. On one of the lots
a vein about twenty feet in width has been found. Sam-
ples of the ore have yielded as much as 22 per cent.
of copper, being also rich in sulphur. Other samples of
pyrites from the same property, free from copper, have
yielded as high as 48 per cent. of sulphur. The only
drawback to this property is in its distance from the
railway, it being about four miles from Garthby Station,
Quebec Central Railway. A new line is chartered,
however, which, when built, will run directly through
the property.

TOWNSHIP OF ACTON.

- 8th. The Acton Mine, 100 acres, with engine, boiler,
pumps and appliances. Within three years after this
mine was first opened it produced nearly \$500,000
worth of copper. It is situated about half a mile distant
from the stations of the Grand Trunk and South Eastern
Railways.

- 9th. Brome Mine, part Lots 2 and 3 R. 4, 50 acres.
- 10th. Bolton Mine, two miles from Eastman Station,
Waterloo & Magog Railway, 400 acres.

The above properties formerly belonged to the Canadian Copper and Sulphur Company, and were acquired by the present owner at sheriff's sale, giving an indisputable title thereto.

The whole or any portion of the property will be sold at reasonable prices.

For further information apply to

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Mining Regulations

TO GOVERN THE DISPOSAL OF

Mineral Lands other than Coal Lands, 1886.

THESE REGULATIONS shall be applicable to all Dominion Lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, iron or other mineral deposits of economic value, with the exception of coal.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein either by surface or subterranean prospecting for mineral deposits, with a view to obtaining under the Regulations a mining location for the same but no mining location or mining claim shall be granted until the discovery of the vein, lode or deposit of mineral or metal within the limits of the location or claim.

QUARTZ MINING.

A location for mining, except for iron on veins, lodes or ledges of quartz or other rock in place, shall not exceed forty acres in area. Its length shall not be more than three times its breadth and its surface boundary shall be four straight lines, the opposite sides of which shall be parallel, except where prior locations would prevent, in which case it may be of such a shape as may be approved of by the Superintendent of Mining.

Any person having discovered a mineral deposit may obtain a mining location therefor, in the manner set forth in the Regulations which provides for the character of the survey and the marks necessary to designate the location on the ground.

When the location has been marked conformably to the requirements of the Regulations, the claimant shall within sixty days thereafter, file with the local agent in the Dominion Land Office for the district in which the location is situated, a declaration or oath setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as aforesaid; and shall, along with such declaration, pay to the said agent an entry fee of FIVE DOLLARS. The agent's receipt for such fee will be the claimant's authority to enter into possession of the location applied for.

At any time before the expiration of FIVE years from the date of his obtaining the agent's receipt it shall be open to the claimant to purchase the location on filing with the local agent proof that he has expended not less than FIVE HUNDRED DOLLARS in actual mining operations on the same: but the claimant is required, before the expiration of each of the five years, to prove that he has performed not less than ONE HUNDRED DOLLARS' worth of labor during the year in the actual development of his claim, and at the same time obtain a renewal of his location receipt, for which he is required to pay a fee of FIVE DOLLARS.

The price to be paid for a mining location shall be at the rate of FIVE DOLLARS PER ACRE, cash, and the sum of FIFTY DOLLARS extra for the survey of the same.

No more than one mining location shall be granted to any individual claimant upon the same lode or vein.

IRON.

The Minister of the Interior may grant a location for the mining of iron, not exceeding 160 acres in area which shall be bounded by north and south and east and west lines astronomically, and its breadth shall equal its length. Provided that should any person making an application purporting to be for the purpose of

mining iron thus obtain, whether in good faith or fraudulently, possession of a valuable mineral deposit other than iron, his right in such deposit shall be restricted to the area prescribed by the Regulations for other minerals, and the rest of the location shall revert to the Crown for such disposition as the Minister may direct.

The regulations also provide for the manner in which land may be acquired for milling purposes, reduction works or other works incidental to mining operations.

Locations taken up prior to this date may, until the 1st of August, 1886, be re-marked and re-entered in conformity with the Regulations without payment of new fees in cases where no existing interests would thereby be prejudicially affected.

PLACER MINING.

The Regulations laid down in respect to quartz mining shall be applicable to placer mining as far as they relate to entries, entry fees, assignments, marking of localities, agents' receipts, and generally where they can be applied.

The nature and size of placer mining claims are provided for in the Regulations, including bar, dry bench, creek or hill diggings, and the RIGHTS AND DUTIES OF MINERS are fully set forth.

The Regulations apply also to

BED-ROCK FLUMES, DRAINAGE OF MINES AND DITCHES.

The GENERAL PROVISIONS of the Regulations include the interpretation of expressions used therein; how disputes shall be heard and adjudicated upon; under what circumstances miners shall be entitled to absent themselves from their locations or diggings, etc., etc.

THE SCHEDULE OF MINING REGULATIONS

Contains the forms to be observed in the drawing up of all documents such as:— "Application and affidavit of discoverer of quartz mine." "Receipt for fee paid by applicant for mining location." "Receipt for fee on extension of time for purchase of a mining location." "Patent of a mining location." "Certificate of the assignment of a mining location." "Application for grant for placer mining and affidavit of applicant." "Grant for placer mining." "Certificate of the assignment of a placer mining claim." "Grant to a bed rock flume company." "Grant for drainage." "Grant of right to divert water and construct ditches."

Since the publication, in 1884, of the Mining Regulations to govern the disposal of Dominion Mineral Lands the same have been carefully and thoroughly revised with a view to ensure ample protection to the public interests, and at the same time to encourage the prospector and miner in order that the mineral resources may be made valuable by development.

COPIES OF THE REGULATIONS MAY BE OBTAINED UPON APPLICATION TO THE DEPARTMENT OF THE INTERIOR

A. M. BURGESS,

Deputy Minister of the Interior

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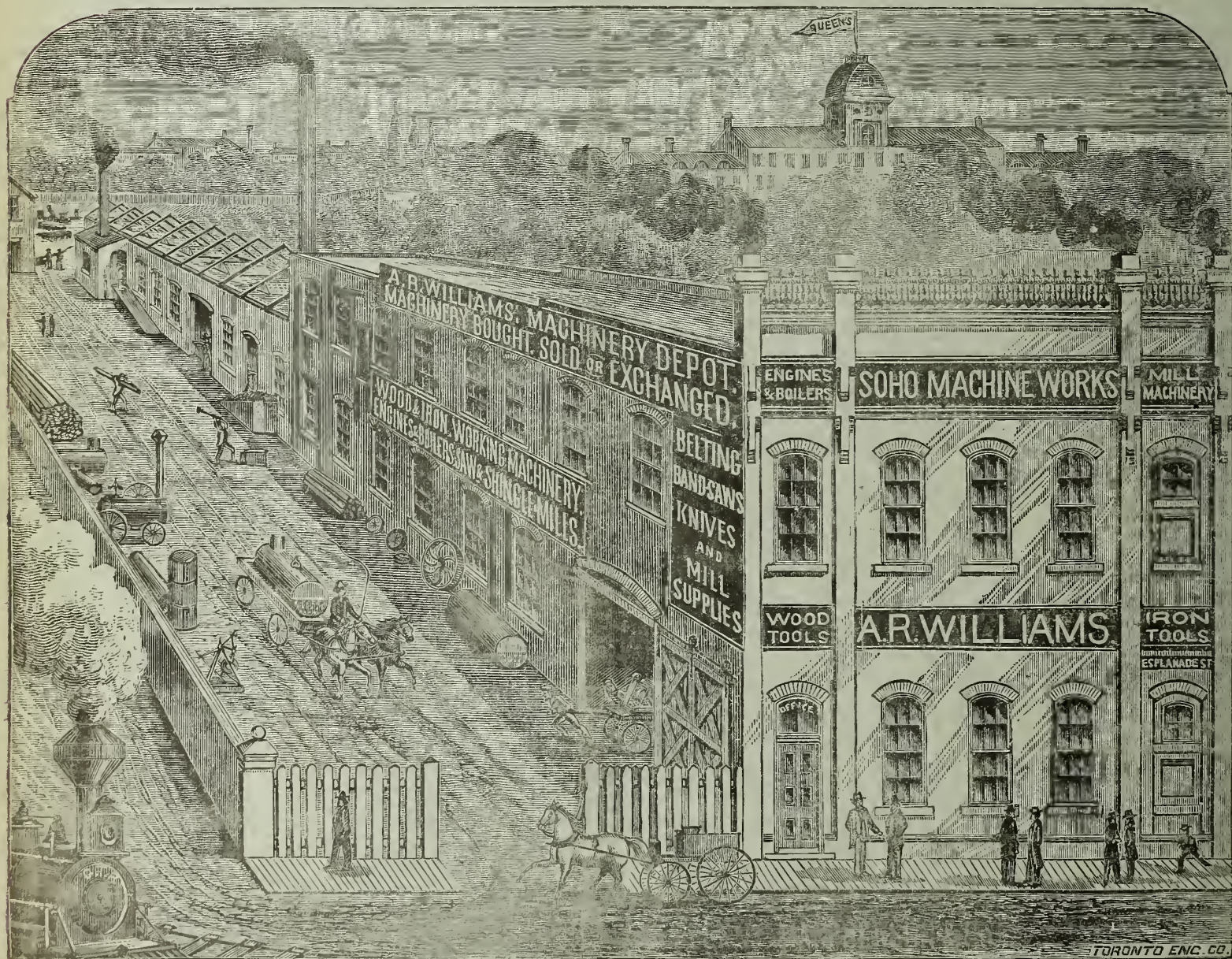
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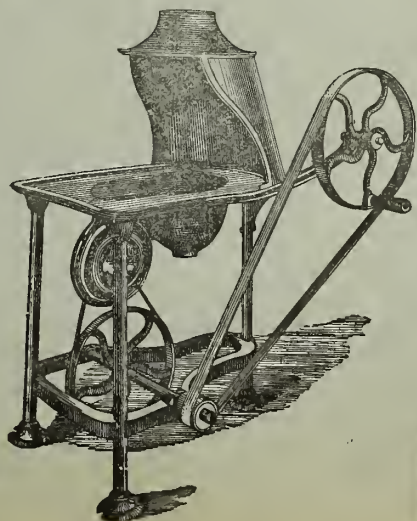
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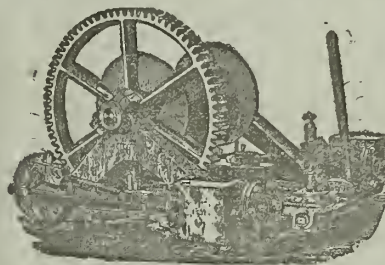
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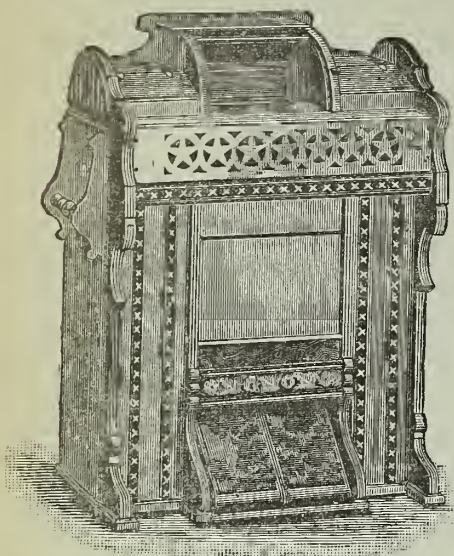
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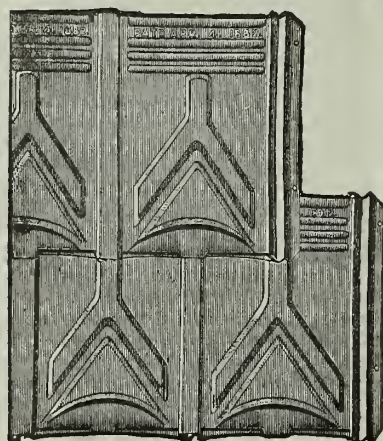
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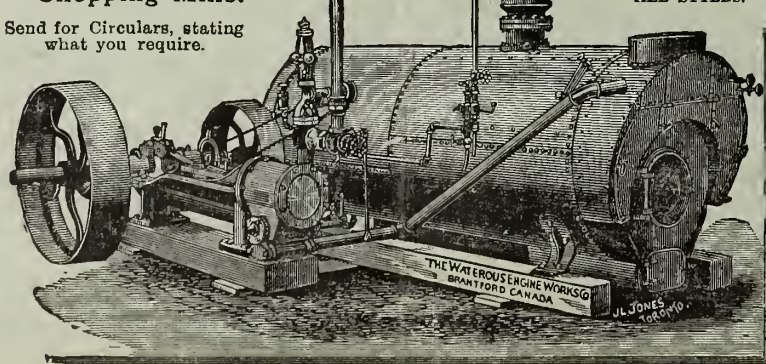
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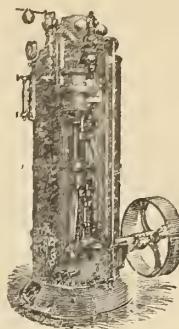
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application.

Rubbing it in.—How many years does this
progressive and Liberal Government of Ontario
intend to allow to pass before Fraser in Brock-
ville, Hardy in Brantford, Mowat in England,
and the Rosses going to the States or elsewhere,
will learn what is transpiring in the Ontario
mining country? How long a time is to be
lost before this Government will issue the pro-
clamation and open up the country to the poor
man? From Sudbury, southwest along the
Canadian Pacific, we have as rich a country in
mining wealth as California. Instead of it
being open to the inhabitants, it is reserved for
capitalists and friends of the Government.
Look at the names of those who are the
owners in the township of Denison? Is there
one working man on the list? Yet in Califor-
nia the discoverers received what they found.
In Canada they only prospect other people's
land. The law is good enough if the Govern-
ment would put it in force, but they are either
so neglectful or so ignorant that they do not
know enough to proclaim it.—*Empire.*

The Recovery of Gold from Refractory Ores.—A new process for the recovery
of gold from refractory ores has been patented
by Mr. J. H. Pollok, assistant to the Professor
of Chemistry at the University of Glasgow. It
is said to be cheaper than other processes, the
comparison being that while by older processes
the extraction is only 80 per cent., and the cost
20s per ton, by this process the cost is put at
6s 6d per ton and the extraction at 97 per cent.
A great many experiments have been made in
the Glasgow University, in the presence of
Principal Caird, Sir William Thomson, Profes-
sor Ferguson, Dr. Stewart and others; and most
favourable opinions have been expressed by
scientific and practical men as to the value of
the patent. In one experiment 9,000 grains of
tailings were treated, and out of 330 grains of
gold present 320 were extracted, the residue
containing only 10. Samples of ore from
New Zealand, South Africa, Queensland and
Victoria have been successfully treated. Pro-
fessor Ferguson writes that the process is
specially applicable to "light" gold, is a rapid
one, that the apparatus is of the simplest kind,
and there is nothing about it to get out of
order; that the cost of materials for the extrac-
tion runs from 4s 6d to 6s per ton; and that
the gold is almost entirely extracted.

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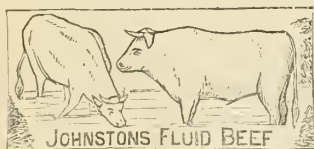
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TO THE STOMACH,
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June 12th, 1888.

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Solid Petroleum as Fuel.—Experiments are being carried on in Russia with the view of finding a process, at once practical as well as desirable, on the score of economy and cleanliness, of solidifying the petroleum used as fuel. According to the report made to the Russian Government by Dr. Kauffmann, who has had the principal charge of these experiments, a successful method of accomplishing the desired result consists simply of heating the oil, and afterwards adding from 1 to 3 per cent. of soap. The latter dissolves in the oil, and the liquid on cooling, forms a mass having the appearance of cement and the hardness of compact tallow. The product is hard to light, burns slowly and without smoke, but develops much heat, and leaves about 7 per cent. of a hard black residuum.

A Mining Mystery.—In the whole history of coal mining never has so strange a bit of news as the following been printed. "A short time ago a Goole firm commenced to work one of the thin seams of coal at Worsbro' Dale, a short distance from the Edmunds Main Colliery, by means of a dry-hole. In the course of their work the men were surprised to find they had no water to contend with. For some time it was conjectured that the workings connected with the Barnsley seam at the Edmunds Main Colliery were taking this water. This, however, turned out to be not the sole cause, for much to the surprise of the miners, they broke into some old workings, and found that the same seam had been got. The most singular part of the story is that there were no indications on the surface that the coal had been won at any time, and no person living can remember coal being got there. At the same time nothing is known by the owners of the minerals that they had been got at that place. Much interest is being evoked by the incident. —*Sheffield Independent.*

Business Principles Essential to Success.—The mining for gold and silver, copper and lead, can be, should be, nay, must be put and maintained upon the same footing or business management as the best managed of the railroads and the best managed of the coal mining enterprises of Pennsylvania. But mining enterprises worthy of consideration must start upon the basis of meritorious mineral properties more or less developed, with a valuation, in the outset, to those investing money in their exploitation, honestly or equitably adjusted between all the parties interested. Mere prospect holes should not be so incorporated, and the shares thereof floated upon the market at a price which gives a money value of from one hundred thousand to five hundred thousand dollars to 1,500 by 600 feet of barren scoria and other rock rubbish. There is an abundance of good mineral properties to be had by proper seeking, at reasonable prices, the development of which to a profitable stage is an assured business matter if the same care, judgment, energy and earnestness of purpose shall be brought to bear to that end which are regarded essential for success in any other business enterprise. And while this is the absolute fact, at the same time, it can be rightly claimed for mining enterprise that in

no other undertakings is there such chance for making a great deal of money upon a comparatively small investment as from mining ventures. —*Financial Record.*

New Method of Controlling the Pressure of Natural Gas.—Mr. C. N. Payne, manager of the Buffalo Natural Gas Company, has invented a method of controlling the pressure of natural gas that appears likely to prove a complete success. From the main that supplies the city he had constructed a pipe of equal strength and size which connects with and penetrates a boiler six feet in height and six feet in diameter to within eight inches of the bottom. Into this enough water has been poured to cover the mouth of the pipe, which is open, with twelve inches of water, which corresponds with a pressure of 4 7-10 ounces. From the boiler a pipe similar to a smoke stack also extends and any pressure in excess of the 4 7-10 ounces immediately forces the gas through the water and it escapes through the pipe smoke stack into the air. A water gauge on the outside of the tank shows the exact amount of water in the tank. Evaporation of course lessens the amount of pressure; for without any water in the tank the gas would nearly all escape. A local paper also describes another device that is being exhibited and tested there by Dr. G. A. Scroggs, of Beaver, Pa., of the Beaver Manufacturing Company. Its arrangement is said to be of the most simple nature, controlling a cut off which completely closes both when the pressure gets too low or too high. It is regulated so that it closes when the pressure falls below two ounces or goes above six ounces, the latter being the highest pressure used in houses burning the gas in Buffalo. In this way there is almost absolute safety, as it does away with the danger of escaping gas in either event. The device, however, can be fixed so that it will control the gas at a pressure running up into the pounds. It is automatic of course and Dr. Scroggs says it meets with the entire approval of Mr. Payne, who has ordered a number of them for use in Buffalo. —*Progressive Age.*

Recognition of Bravery.—On the 5th ult. the Masonic fraternity of British Columbia unveiled a handsome monument to the memory of Samuel Hudson, a member of the order, who lost his life in an attempt to rescue the miners in No. 1 Shaft, Nanaimo, after the disastrous explosion of May 3rd, 1887. The monument was erected in the Nanaimo Cemetery, and is ten feet high. It consists of a broken pillar firmly set on a double base, and is an imposing structure. On the base is the following inscription:

"Erected by the Masonic Brethren to the memory of Samuel Hudson, aged 37 years, who died May 3rd, 1887, in a brave attempt to rescue coal miners after the terrible explosion in the No. 1 Shaft, Nanaimo."

Mr. Hudson heard of the disaster, hastened from Wellington, and formed one of the searching and rescuing party that went into the burning mine. Venturing too far from the air current, he was overcome and suffocated before he could be taken to the surface by his comrades. Such instances of bravery and philanthropy are worthy the highest honors, and the Masonic fraternity of British Columbia has fittingly bestowed on him a deserved honor.

WANTED—Situation as Foreman Engineer at Mines. Sixteen years experience erecting, repairing and running Hoisting, Pumping and Air Compressing Engines and machinery. Would undertake in connection with above, the duty of Time and Storekeeper or Outside Overman. References if required. Address "Engineer," office of THE CANADIAN MINING REVIEW.

The Canadian Mining Review

CONDUCTED BY B. T. A. BELL.

OFFICES:

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OTTAWA.

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Asbestos and Its Uses.

Asbestos has been aptly described as a physical paradox. It has been called "a mineralogical vegetable; it is both fibrous and crystalline, elastic yet brittle; a floating stone, which can be as readily corded, spun, and woven into tissue as cotton or the finest silk." In general terms it may be said to be a fibrous variety of serpentine, closely allied to the hornblende family of minerals, the Canadian variety of which is called by mineralogists "chrysotile." In the local vernacular of the mining districts this is *pierre-à coton* (cotton-stone), perhaps as expressive a term as can be found. Its constitution and properties have been known for ages. The ancients, we are told, believing it to be a plant, made a cere-cloth of it, in which they were accustomed to wrap the bodies which were to be burned on the funeral pyre, so that the ashes might be retained, separate and intact, for preservation in the family urn. It is related of Charlemagne, that having a cloth made of the material, he one day after dinner astonished his rude warriors by throwing it in the fire, and then withdrawing it cleansed and unconsumed. For centuries asbestos was regarded merely as a mineral curiosity, and, in spite of its indestructibility by fire, it is only within recent years that it has developed into a valuable article of commerce, the first modern experiments in the use of it practically extending no further back than 1850. Now, however, it is put to many important uses, as in the manufacture of different kinds of packing for engineering work, millboards, felts, lubricants, paints, fireproof cloth, roping, etc., etc. These are fully and ably described in an interesting little work, "Asbestos and Its Uses," recently published by Crosby, Lockwood & Co, London. The author, Mr. R. H. Jones, resided for some time in the Eastern Townships, and it is evident from a perusal of his book that he possesses an extensive knowledge of the mineral, and is fully conversant with the many uses to which it is now being put, while his interesting descriptions of our mines is a feature of excellence which will be appreciated by all interested in the growth and advancement of the industry in this country. Discussing the relative merits of the Canadian and Italian varieties of the mineral, Mr. Jones says: "I think we may safely conclude that both possess undeniably good qualities, and that there is an ample field for both, inasmuch as the peculiar properties which render one kind unsuitable for some particular purpose are often precisely those which best adapt it for another. Each variety will assuredly make its own way and take its proper place in public estimation, as

"further experiments and greater experience in the use of it shall bring its special value more prominently to light. Ample proof has been given of the valuable qualities of Italian asbestos; and if any proof were needed of the intrinsic value of its Canadian competitor, nothing more would be required than to point to such houses as that of John Bell & Son, of London; of Wertheim, of Frankfort; or of the John's Manufacturing Company, or of the Chalmer's-Spence Company, of New York, whose world-renowned manufactures are made of Canadian asbestos alone. The essential characteristics of both sorts are alike in this respect, that they are absolutely indestructible by fire, or even when exposed to the action of any known acid; the Canadian variety possessing in addition, in a very high degree, that strange peculiarity (which is also claimed for one of the Italian sorts), and is common also to plumbago and soapstone, of being a self-lubricator. Good Canadian fibre is known at once by its soft, greasy, soapy feeling, and one of the leading New York firms claims for its products, made entirely of Canadian asbestos, that they will resist even the flame of the blowpipe; and further asserts that this mineral transcends all previously thought of materials for fire-proofing, in that it is not only absolutely indestructible by fire, but that its power of resistance cannot be worn away or diminished by lapse of time or hard usage, as invariably happens in the case of such applications as tungstate of soda."

Regarding its use, Germany is a very large consumer. In France the consumption is not so great, although manufacturers in that country are now beginning to stir themselves, especially in regard to some very valuable kinds of paper, which they are making entirely out of Canadian fibre; and Paris has now set the world an example by the adoption of the Chevalier Aldinis' plan of clothing firemen in a dress of asbestos cloth. America, however, is the country where the most rapid strides are being made in the development of every branch of this new industry, and there also the Canadian fibre is alone used. A considerable quantity of it is made use of in England in the arts and manufactures, but, Mr. Jones thinks, England lacks in some degree the readiness which is found on this side of the ocean in the adaptation of new materials and new methods of work.

Carbo-Dynamite.—This is the most recent addition to the already lengthy list of explosive compounds. Carbo-dynamite is not hygroscopic, water apparently having no action upon it. This freedom of exudation points to its use in fiery mines. It is claimed that the large volume of steam generated at the moment of explosion not only extinguishes any flame which might have been produced, but also adds considerably to the effect of the shot. It does not produce any fumes of a deleterious nature. It is further claimed that the explosive force can be regulated, that its manufacture is simple and inexpensive, and that the price does not exceed ordinary dynamite.

LETTERS TO THE EDITOR.

We invite Correspondence upon matters consistent with the character of the REVIEW. Be as brief as possible. The writers name in all cases required as a proof of good faith.

One dozen copies of the issue containing his communication will be mailed free to any correspondent on request.

We do not hold ourselves in any way responsible for the opinions expressed in this section of the REVIEW.

The Mineral Resources of Canada.

OTTAWA, 21st June, 1888.

The Editor

THE CANADIAN MINING REVIEW:

SIR,—The statement in the *Engineering and Mining Journal* of New York, 9th June, to the effect that "Canadians are ignorant of most of the vast mineral riches their country contains, and comparatively indifferent to what they do know," is incorrect and misleading, and the person who penned such a statement can only be regarded as measuring the knowledge of others by his own.

I have no hesitation in saying, considering the area of the country, the limited population, and the difficulties of access to large portions of it, that the minerals of Canada, and where to seek them, are as well, if not better, known than are those of any similarly situated and equal area of country in the world.

That many of these deposits are not yet developed is quite natural, and is due neither to "ignorance" nor "indifference," but arises chiefly from the circumstances above referred to.

Those who, without knowledge, write such articles as have recently appeared in some of the papers, and been quoted in others, do not seem to see that their statements are self-contradictory.

The late Senate Committee made no investigations in the country, and was, therefore, entirely dependent on existing knowledge for any facts it may have adduced. Its function was, however, not the less useful in the direction of giving wider publicity to these facts, most of which, however, had already been ascertained through the explorations of the Geological Survey, and can be gathered, by anyone desirous of doing so, from the reports and maps that have been published by the Survey, or in special cases by personal or written application to the Director.

The mineral resources of Canada, though great, are not exceptional, and, except in some minor details, do not differ from those of other countries.

They are being steadily explored, and gradually developed *pari passu* with the opening up and settlement of the country.

To attempt to do so in advance, or under manifestly adverse circumstances, results in large outlay and no immediate return, and from this rule, in every new and unsettled country, gold, precious stones, and a few other minerals, in which small bulk represents large value, alone are an exception.

The indifference referred to, so far as it exists, arises from the knowledge and keen appreciation of these facts possessed by Canadians, and in many instances it is the outcome of experience generally dearly bought by following the advice of the practical miner, instead of that of the scientific and not less practical geologist. Yours, &c,

ALFRED R. C. SELWYN.

Director of the Geo'l Survey of Canada.

The Dominion Mining Laws.

OTTAWA, 14th July, 1888.

The Editor

THE CANADIAN MINING REVIEW:

I have read your valuable journal with a good deal of interest. In your issue of February there appears a letter by "Canadian"—who, by the way, seems to speak with a good deal of authority—on this question. On his statement, whoever he may be, I would like to know how he explains the following case if there are no "speculators, or land sharks, etc," interfering with the rights of discoverers. Having made a discovery of a mineral substance used in manufacture or trade not known to have hitherto existed in Canada, I had the claim surveyed and plan furnished by a Dominion Land Surveyor, also affidavits testifying to the facts of the discovery, and the claim approved of by the Hon. Sir D. L. Macpherson, the then Minister of the Interior, as contained in Department File Reference No. 6583 T. and M. How does it come that this claim is not settled if there are no "speculators or land sharks" interfering with the rights of discovery in this case since the 21st of May, 1883?

I am, yours respectfully,

PETER MACGREGOR.

Phosphate of Lime in the Chazy Formation about Ottawa.

By Henry M. Ami.

In the "Report of Progress" for 1851-52, published by the Geological Survey of Canada, under Sir Wm. Logan's administration, the last named eminent authority describes (p. 28) the occurrence of nodules at the base of the calcareous strata in the Chazy formation, and points out several localities along the Ottawa River where these 'phosphatic nodules' may be found. An analysis made by Dr. Sterry Hunt of the Hawkesbury nodules gave the following results:—

Phosphate of lime (bone earth).....	44.70
Carb. of lime.....	6.60
" magnesia.....	4.76
Per ox. of iron and trace of alumina....	8.60
Insoluble silicious residue.....	27.40
Volatile matter.....	5.00

97.56

The following notes are given by Sir Wm. Logan respecting their mode of occurrence:—"Small black phosphatic nodules are mentioned by Mr. Murray as occurring at the base of the Chazy limestone. On the 33rd lot of the 7th concession of Lochiel, where they were sparingly disseminated in the rock, they occur in precisely the same stratigraphical place, on the rear of the 10th lot of the 1st concession of West Hawkesbury, where they are rather larger, but still in sparing quantity. As the nodules, however, when separated from the rock, hold, according to the analysis of Dr. Hunt, a large amount of phosphate, they would probably render the limestone beds in which they occur of more than ordinary value, to be burnt for agricultural application when lime is required, as the phosphate can scarcely fail to be of additional service. Small black phosphatic nodules exist also in their sandstone beds interstratifying green slates at Grenville. * * *

"Brown nodules of the same description, but larger in size, occur in a conglomerate, supposed to be of the same age as the Grenville beds, at Allumette Falls on the Ottawa."

Similar nodules have been found in different formations, and were formed at different periods

in the earth's history. They are not unfrequently met with in shales holding abundance of Lingulae, and the fact that the shells or hard parts of those creatures were phosphatic in composition evidently accounts for the prevalence of phosphatic materials in the beds which hold their remains in abundance.

In examining the series of the geological formations, as they are developed at Ottawa, no one can fail to recognize the dark brown or chocolate coloured shales, which crop out at Aylmer, the Hog's Back, Skead's Mills, Lower Gatineau Ferry, Hemlock Lake, Green's Creek and elsewhere, as constituting a well-defined series of strata, whose position is intermediate between a calcareous or limestone formation above and a sandy or arenaceous formation below. Looking closely into these shales they are seen to teem with the remains and fragments of Lingulae, which, as stated above, are pre-eminently phosphatic in their chemical composition.

The great abundance of these fossil shells and their nature leads one naturally to arrive at the same conclusion that Sir Wm. Logan arrived at, viz: that such beds as hold these might afford a fertilizer.

Prof. Saunders, of the Central Experimental, has already kindly expressed his desire to have these shales analyzed at the 'Laboratory' in order to ascertain their real and practical value as a fertilizing agent. Experiments might also be made on crops, and the result would be looked forward to with no small interest.

It may thus appear that 'phosphate of lime' may be found in tolerable abundance and quite at hand, but belonging to a series of strata essentially different in origin and mode of deposition from those rocks which are well-known to afford the mineral *apatite* or phosphate of lime in the Templeton and Buckingham districts, north of the Ottawa. There is no doubt, however, in the case of the phosphate in the phosphate bearing shales of the Chazy formation, that they are purely of organic origin. That mineral having been secreted and deposited in the usual manner round the outer edge of the creature's mantle, as has been nicely pointed out by various writers on the subject. Whether or not the *apatite* from the Laurentian system is of organic origin is a doubtful and open question; sufficient to say, that previous to the deposition of the Chazy formation phosphate of lime existed in solution and otherwise, so that one of the oldest genera of shells—the genus *Lingula*—found abundant material wherewith to build its skeletal parts, which are to a great extent composed of phosphate of lime, and the presence of these *Lingulae* makes the shales of undoubted value.

Mineral Resources of Nipissing and Hudson Bay.

In connection with the projected Nipissing and James Bay Railway, a few notes may be interesting on what is already known of the varied mineral resources of the country between Lake Nipissing and the salt water which lies at a moderate distance due north of it, and also as to the great mineral wealth of Hudson's Bay itself.

It is well known to geologists that the Huronian rocks constitute the great metaliferous system of Canada, as well as of the States of Michigan, Wisconsin and Minnesota. Their equivalents in other countries likewise produce a variety of metallic ores. On the other hand, the Laurentian rocks on the Hudson's Bay side of the watershed, at all events, have not yet af-

forded any indications of useful minerals. So that the Huronian areas of a geological map are those in which alone we may look for mineral wealth in the region in question.

With the exception of one interruption, the Huronian rocks extend all along the north shore of Lake Huron from the St. Mary's River to Killarney, and it was from their extensive development in this region that they derived the name Huronian. From this shore line, as a base, has traced these rocks continuously to the north-eastward as far as Lake Temiscaming and thence, beyond the watershed to the country lying northeast of Grand Lake on the Upper Ottawa, whence they are continued in the wide belt of similar rocks which reaches to the south end of Lake Mistassini. A great area of igneous rocks belonging to this system lies to the south of Lake Abitibi. The late Mr. Walter McOwat of the Geological corps showed that the Huronian rocks also extended to the northward of this lake, and in 1877 Mr. A. S. Cochrane traced the same rocks for a long distance down the Abitibi River.

Starting from Lake Nipissing, the line of the projected railway would run for a short distance on the Laurentian rocks, but it would enter on the great Huronian area before reaching Lake Temagami. Thence it would continue upon these rocks past Lakes Temiscaming and Abitibi and to a point midway to the south extremity of James Bay, or for nearly two thirds of the entire distance. The last few miles would be upon the level Devonian rocks near the commencement of the extensive basin of this formation which occupies a vast tract of the westward of James Bay.

The gold bearing rocks of the Township of Denison constitute a belt of the Huronian system, and as these rocks have a uniform northeast strike in this region they pass about Lake Temagami, where gold and silver are also known to occur, and they no doubt cross the Montreal River and run far to the northeast. A very large deposit of argentiferous galena is now being worked on Lake Temiscaming. Between Lake Temagami and Montreal River is a lake, about twenty-five miles long, which Dr. Bell surveyed last summer, and to which he gave the name of Lady Evelyn Lake. Here a vein of argentiferous galena, and veins of copper with more or less gold and silver, were discovered. Asbestos was also found in the same neighborhood. Iron ore was reported by Mr. McOwat at the Quinze Rapids, and although the quality at this place was not very good its occurrence there is interesting, as showing that the Huronian rocks maintain their iron-bearing character in that direction, and richer deposits may be confidently looked for. Roofing slates of fair quality are found in abundance on the Mata-betchewan River and Lake Temagami.

The copper strata of Sudbury begins at the old Wallace mine on Lake Huron, and after passing through Sudbury and Lake Temagami, reaches the Montreal River, where deposits of richer ore have lately been found on Bay Lake. It has been met with again on the Blanche and is known to exist near the height of land east of the canoe route between Lakes Temiscaming and Abitibi. Further to the northeast, it was found, still rich in copper, by the late Mr. Richardson of the Geological Survey, a short distance southwest of Lake Mistassini. Among the minerals most in demand at the present time is the fine silky asbestos, such as that of Coleraine and Thetford in the Province of Quebec. Last year this valuable substance was discovered near the head waters of the Montreal River.

If Moose Factory were the objective point on James' Bay, the line would pass near the large iron ore deposits of the Mattagami River and not far from the lignite and gypsum beds of the Misinaibi and the main Moose River. In any case it would be easy, in that level country, to construct a short branch line to the iron deposits.

When the line once taps the salt water, the shores of a vast sea, which Dr. Bell has happily styled the Mediterranean of the New World, are at once rendered accessible. The east and west shores of this sea each measure about 1,000 miles in length. Those of Roe's Welcome, Fox Basin and the Southampton group of islands, would make at least 2,000 miles, and the two sides of Hudson's Straits another 1,000, or a total of upwards of 5,000 miles of coast line. It is impossible to imagine that the varied resources of this great length of seashore would not afford a considerable traffic. Confining our attention, however, for the present to the mineral resources, Dr. Bell has already pointed out the existence of undoubted wealth of that character in these regions. He has found gold and silver at two places on the east main coast and upon what he named the Ottawa Islands of Mosquito Bay, a thick band of lead-bearing limestone at Richmond Gulf and inexhaustible deposits of fine manganese iron ore on a number of the islands near the coast beyond Whale River. Indications were also found of copper, zinc, molybdenum, asbestos and other useful minerals. Anthracite is also known to exist, but Dr. Bell does not think it is in large quantities.

On the northwest side of the bay, the Haronian rocks are very extensively developed all the way from Eskimo Point to Chesterfield Inlet, and Dr. Bell has enumerated a long list of the various rocks to be met with in that region. Large veins of auriferous iron pyrites and deposits of copper ore, of which, however, little is known, have been found nearly opposite to Marble Island, and free gold in quartz has been discovered at Repulse Bay. Sheet mica is said to exist in great quantities at Chesterfield Inlet, and it was reported some years ago that an American vessel carried a cargo of it to New York. Indications of fine clay ironstone have been noticed by Dr. Bell in many places as derived from the rocks of the immense Devonian basin west of James Bay, which is more extensive than the whole western peninsula of Ontario.

In Hudson's Straits, the geologist whom we have so often quoted has found traces of gold in quantity on the south side, and on the north shore large quantities of a very fine variety of mica in wide sheets, plumbago and pyrites; and the Eskimos report the existence of iron ore in several places in that region.

With such an array of facts it is evident that the projected line of railway has the prospect of a large traffic in minerals. Indeed we know of no line which, in proportion to length, at all equals it in this respect. And it must be borne in mind that the discoveries we have enumerated have been made after only a comparatively small amount of exploration. Very much more is naturally to be expected when a thorough search shall have been made.

Rock Drills Run by Electricity.—Electricity has been successfully applied, as a motive power, to rock drills. The advantage claimed is, that by using it at the heading, the long lines of steam or compressed air pipes usually employed are entirely avoided, and that the stoppages in the work are less frequent.

The Utility of Waste Sawdust as Fuel for Roasting and Smelting our Iron and Other Ores.

The Report of the Select Committee of the Senate appointed to enquire into the extent of the sawdust and refuse deposits from the saw-mills and their effect upon the Ottawa river is before us. This blue book is mainly of interest to the mining community on account of the evidence given before the Commission bearing on the economic importance of the waste produce of the lumber industry as a fuel for roasting ores. Mr. John Stewart, of Ottawa, a mining engineer of wide experience in this and other countries, was examined closely on this important question, and as his evidence contains some valuable information, we reproduce it in full for such of our readers as may not have an opportunity of reading the Report for themselves:

BY HONOURABLE MR. CLEMON:

Q. What is your profession? A. I am a mining engineer.

Q. How long have you been in this section of the country? A. Three and a-half years.

Q. Are you conversant with the saw dust question on the Ottawa? A. I understand a little about the uses to which it might be applied.

Q. Will you give the Committee the benefit of your knowledge of that subject? A. It might be utilized in a small way for the manufacture of paper pulp, and making compressed vessels—pails, tubs and vessels of that kind—and for making brick. It has been utilized for those purposes in Canada; but the large application, almost a Dominion one, as it applies to all the Provinces, it can be used for the manufacture of gas by treating it in proper furnaces, for the roasting of ores and re-heating of iron. The heavy matter from the mills could be made into charcoal, and the products of distillation in the process of making the charcoal will pay for the carbonization of it. That could be used in blast furnaces. The sawdust or fine material can be either manufactured into gas or into charcoal, and compressed into bricks if necessary. It has been done on a small scale. It has been experimented on and proved to be practicable, but not to any large extent as yet. It has been used in the manufacture of gas for the last 20 years in Sweden, and the Swedish association of iron merchants presented the inventor of those furnaces with the sum of \$10,000 for his ingenuity. The Michigan lumbermen utilize their sawdust in the manufacture of salt. They live in a salt region, and they bore wells and get salt springs, and evaporate the brine by burning the sawdust and converting the brine into salt.

Q. Do you know how Mr. Rathbun disposes of his sawdust? A. He uses it all in that way. He makes gas and lights the town of Deseronto, and he makes charcoal, which he sells. There is nothing wasted from his mills.

Q. As an engineer, do you think this sawdust could be utilized profitably? A. I can see no difficulty in it, any more than in the handling of the same number of tons of iron ore, not so much, because you can elevate the sawdust in elevators. You can convey it in a traveller, but you have got to shovel or handle iron ore. Even the sawdust that is now in the river, some of it could be taken out and could be used in a furnace; because sawdust coming direct from the saw, from wet logs containing 45 per cent. of water, can be utilized in that way. That was pointed out in the report of the Geological Survey by Dr. Sterry Hunt, I think, in 1870.

Q. Then in your opinion there is no practical difficulty in those sawmill men utilizing their sawdust and preventing it from going into the river? A. If they make sufficient arrangements for it, there is not.

BY HONOURABLE MR. SMITH:

Q. Did you ever see a sawmill driven by water-power from which the sawdust did not go into the river. A. I do not remember seeing it on the St. John River.

BY THE CHAIRMAN:

Q. Did you ever see it anywhere? A. Yes, the Miramichi sawmills burn their sawdust, but I cannot say that they are driven by water. It is not sufficient to destroy sawdust; the lumbermen ought to make use of it. It is putting it to a wrong use even to burn it. They ought to make it into charcoal.

BY HONOURABLE MR. BOTSFORD:

Q. To make sawdust into charcoal? A. Yes.

Q. Would that not be an expensive process? A. They can do so. They can compress it into bricks in the same way as is done with fine coal dust. In Belgium and the north of France the coal is a poor lignite. It slacks itself or is slacked with water to wash out the sulphur, it is then dried and compressed in brick machines under strong pressure and formed into solid bricks. I have seen a piece of charcoal compressed from refuse cedar and pine at Deseronto, and to a person who did not know, it is like a piece of cast iron.

Q. Would not that be an expensive process? A. No. Senator Archibald can give the expense of that process. It would not be any more expensive than compressing coal dust, which is done down in Cape Breton with the dust from the refuse of the coal mines of that part of the Province.

BY HONOURABLE MR. MACDONALD (B.C.):

Q. What do they mix with it? A. They take a little pitch, but a better means of cementing it is the refuse from the starch factory. Instead of letting it go into the river, they use the refuse from a starch factory, one per cent. of which is sufficient to form a good bond mixed with charcoal.

Q. Would not earth do? A. A clay containing silica would not be desirable; it would need to be a clay containing lime, which would form a slag. The iron which would be manufactured in this way is just the same as the Swedish iron, the finest quality made in the market. If the market of Canada was not large enough—if we manufactured more than the market would take, we could export it, because the United States have to import that quality of iron from Sweden. In fact, charcoal iron has been exported from the Province of Quebec in years past. I think, on a rough estimate, the amount of refuse from the mills here might be put down at something like thirty thousand tons of coal per annum.

BY HONOURABLE MR. BOTSFORD:

Q. Would not the process of making that refuse in to coal be greater than the value of the coal after it was manufactured? A. No, it is not an expensive process, because it burns itself. The sawdust is fed from a large hopper, and falls down on a furnace bed, and that is passed off into gas into chambers; thence it passes off into a reservoir where it would be either brought to the furnaces for the roasting of ore or furnaces for re-heating iron. It is only in the expense of handling. Of course you have got to handle fuel of any kind if you are to roast ore or heat iron, so that the expense is not any greater than coal. Then in the manufacture of charcoal the products of distillation would pay for the expense of it, so that you would have the charcoal for nothing. One of the products is pyroligneous acid, woodspirit, etc., and there are several other products, the result of distillation and carbonization. It is not iron ores alone to be roasted by that gas, the sulphur ores, the large deposits of which we have in this country can be very economically treated with the gas made from sawdust, because gas is a better roasting agent than fuel. That could be used for the manufacture of sulphuric acid for the treatment of our phosphates in the manufacture of superphosphate so that instead of shipping the crude apatite to England, we would manufacture it in this country and ship it in a manufactured state.

BY HONOURABLE MR. HAYTHORNE:

Q. And we could use it on our farms? A. Yes, and use it on our farms.

BY HONOURABLE MR. BOTSFORD:

Q. Do you reside in Ottawa? A. Yes.

Q. Have you seen the explosions which take place under the ice? A. I have seen them in summer—small explosions, never any large ones—when I have been out boating.

BY HONOURABLE MR. CLEMON:

Q. You have been on the river often and seen the deposits of sawdust in the river? A. Yes.

Q. Have you seen deposits of any extent? A. Yes; I have seen large banks of sawdust.

Q. What is the effect of that on the navigation of the river? A. If it continues it will certainly obstruct navigation; the river will have to find a new channel. The rays are being filled up now and afterwards the channel will get filled up and the river will eat in on the banks.

Q. Have you observed the effect of the sawdust on the fish? A. It covers the spawning beds and it gets into the gills of the fish and of course they will not come up the river.

Q. Have you observed the effect of the decomposing sawdust on the health of the community? A. The gas that comes from it is much the same as the nasty marshy gas which comes from the swamps of ague malarial districts. It is produced from the same cause—the decomposition of vegetable matter.

Q. It is poisonous in its nature? A. It is, in excess. It is light carburetted hydrogen gas, and when it mixes with oxygen from the atmosphere it is explosive.

By HONOURABLE MR. HAYTHORNE:

Q. You think this mill refuse can be removed by the proprietors of these mills without incurring any extra cost to them? A. To some it would involve more cost than others, but I cannot see any more difficulty in handling it than in handling the same amount of iron ore. I do not think that the majority of the lumbermen are against the utilization of it; the thing is to get them all harmonious—one mind.

Q. Does it require united action? A. It requires united action to make it a success—to get them all to unite and have it utilized in the way I have referred to.

Q. Supposing they united, would the result be a profit to them or a loss? A. It would be a profit. If they will give all the waste from the mills, I can get a company to take hold of it, that is to say, as soon as they work their mills, if they will give all the product of their mills to a company.

By THE CHAIRMAN:

Q. You mean in the way of sawdust? A. In the way of sawdust and slabs; if they will give all the waste from the mills, I can get a company that will take it away and use it.

By MR. CHRISTIE (*Counsel for Lumbermen*):

Q. Have you not been sometime engaged trying to get the lumbermen to go into a company? A. Yes, I have spoken to them.

Q. In that case, giving a company, you would be interested in getting the sawdust not put in the river of course; can you tell me any place on this continent where sawdust has been used for smelting iron? A. I said Rathbun had utilized it and had compressed it—charcoal has been made.

Q. I mean the sawdust? A. It does not matter whether you make charcoal from wood that has come from the sawmills or not, it is charcoal.

Q. Do you know any place in the world where sawdust has been used in smelting iron, directly or indirectly? A. I can say for sawdust—not in this country, but it has been used in Sweden.

Q. Will you tell me the places in Sweden where it has been used? A. It has been used all over Sweden and Norway.

Q. Tell me one place? A. Carlstadt and Monkfords.

Q. Tell me any one person that has ever used it? A. It has been used by M. Lundin, the inventor of the furnace.

Q. Does he not smelt the iron from gas? A. He uses the sawdust to make gas to roast the iron ore and to reheat it. Charcoal is used in the blast furnace.

Q. Has it been used for smelting iron here at all? A. Gas has been tried in the United States. It is not impossible to do it, but it has never been done so far—not with natural gas.

Q. I mean gas from sawdust? A. Not in the blast furnace, but in the heating, roasting and re-heating of iron it is better than any other fuel.

Q. Can you tell me any place where sawdust of this quantity has ever been used at all for, say, a pulp mill? A. I can say that in Michigan it has been used to a very large extent for the boiling of brine.

Q. You mentioned a pulp mill? A. I said there were the small applications.

Q. I suppose the output of the mills at the Chaudiere for one week would supply all the pulp used in Canada in a year; would it not supply all the paper required in Canada for ten years? A. I do not know the paper industry, but that is a small matter compared with the iron.

Q. You say that the sawdust produced each season at the Chaudiere is equal to 30,000 tons of coal; can you give us an idea of what it would cost to convert that into charcoal—from actual experience I mean, not theory—can you tell us anything? A. It depends on machinery. I think it costs two and a half cents a bushel.

Q. Do you know that from experience? A. Yes.

Q. Where is it done at two and a half cents a bushel? A. It has been done in Canada here.

Q. Where? A. In the Province of Quebec.

Q. At what place? A. At the St Morrice, and Drummondville Forges, near Three Rivers.

Q. In any quantity? In large quantities.

Q. What would you call a large quantity? A. Thousands of bushels—that is for the burners—the cost of manufacturing.

Q. What would be the cost of handling and manufacturing, say in Ottawa here—it would have to be removed a distance from the mills I suppose? A. That is a matter of detail that it is not necessary to go into.

Q. You could not tell the Committee what it would cost. A. I can tell them if they wish.

Q. But you do not know now what it would cost? A. I have not got all the figures, but I have the papers at home that will show it.

Q. To manufacture this sawdust for anything useful that you mention, would it not be necessary to convey it at least half a mile from the mill? A. In transporting it on a railway if you move it a few hundred feet it would not cost much more to move it a mile.

Q. How much would it cost to move it from the mills? A. When it is lifted by an elevator into a little car, and that is dumped into a bin which is higher than the railroad track, the bin doors open and the railroad car is filled. The car has a false bottom. The train comes along and takes the waste. The cars with false bottoms run over other bins at the smelting works, the bottom is opened and the refuse is dropped into a series of bins that will hold fifty or one hundred thousand tons. Then that is conveyed to the kilns or to the sawdust furnace by small cars. There is not any more difficulty—not as much as in handling iron ore.

Q. Can you tell me what would be the cost per ton of moving it a mile? A. Freight on the Intercolonial Railway and other railroads—

Q. I do not mean that; what would it cost per ton to move this material a mile? A. It is like any other freight, one cent a ton per mile.

Q. So you think the mill owners could move it from their mills at one cent a ton per mile? A. Yes.

Q. Moving it a mile you would estimate the rate the same as if it were carried 100 miles? A. Yes, that is the rate on the Intercolonial Railway.

Q. Do you think the railway would take it at that rate for that distance? A. I think so.

Q. But you could not give me an idea what it would cost per ton to manufacture this—the absolute cost? A. I do not think it is necessary to go into all the details of it here, because I would be giving away information that has cost me a great deal of time and labor to find out, and if I am giving it away to the public I am giving it to people who will not thank me for it.

Q. Then you are interested in having the sawdust utilized? A. Yes, deeply interested.

By HONOURABLE MR. SMITH:

Q. Supposing this change was absolutely necessary, how long would it take, a year or more, to get all the necessary apparatus in working order? A. It would take one winter at least—this summer and one winter.

Q. Could it be all done in a year or 18 months? A. I should say it could.

By MR. CHRISTIE:

Q. Would it require any alteration in the mills? A. It might take a little longer, because you have got to erect your furnaces and smelting works.

Q. That could only be done in summer? A. It would take perhaps two years before it could be all in operation.

Q. Would it require any change in the mills at the Chaudiere? A. Yes, some more and some less.

Q. But it would require some change in all of them? A. No, not all; it would not require to change the mills, but it would be necessary to put in additional machinery.

Q. Do you know any experience that has been had in roasting iron ore with sawdust at the Gilmour mill? A. That was a family matter which was mismanaged.

Q. But it was tried, was it not? A. Yes.

Q. Was it a failure? A. That has nothing to do with the matter, it has been successful in the United States and other countries where it has been tried.

Q. As a matter of fact was it not a failure when it was tried here? A. That has nothing to do with the case in point.

Q. Do you know as a fact that it resulted in a failure there? A. I know that some lumbermen have failed in business, but the gentlemen who are conducting the business here now are not failing.

By HONOURABLE MR. HAYTHORNE:

Q. You say the supply of mill refuse is greater than would be required for paper making? A. Yes.

Q. Is it not a fact that pulp is used for a great many purposes besides making paper? A. Yes.

Q. And that these purposes are increasing day by day and year by year? A. Yes, but the use of it that way is so small compared with the quantity that would be required for roasting and heating ores and smelting that it is hardly worth taking into account. It is a very small industry.

Deep Coal Mining.—The total depth of the André Shaft of the Poirier Company in the Charlevoix district is 3,133 feet. The maximum daily output is 500 tons. Hoisting is done in one lift. The ascent is made in 80 seconds. Ventilation is effected by an Guib. fan, delivering 30 cubic meters per second.

The Untimbering of Stalls.

By Audre Dumont, Professor of Mining at the University of Louvain.

(Continued from June issue.)

Methods of Untimbering.—After having described the system of supporting the roof, it is now necessary to explain the method of untimbering. There are three methods suitable for different circumstances, which can be described and brought to bear on the three following cases:

1. Good soil in embanked stalls, only requiring head props, without lengthening bars or ashler pieces.

2. Bad soil in embanked stalls, requiring strong support and careful casing.

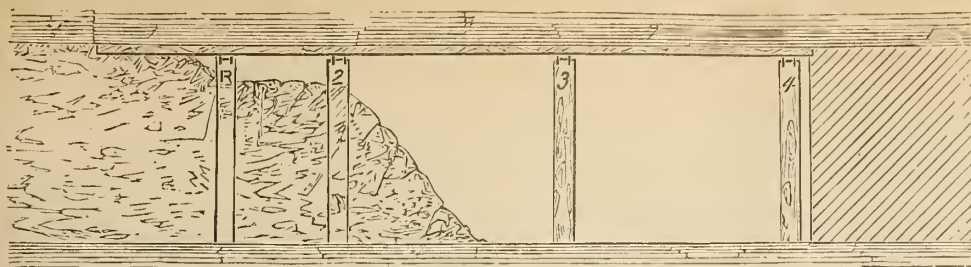
3. Soil of all descriptions in stalls not embanked or only incompletely so.

First Case.—We will take for example the working of an upright stall with the way in the middle. We will suppose that the width of the stall comprised between the way of the air passage corresponds to the length of a lengthening bar (about 4 metres). The miners have advanced 3-4 (Figs. 1 and 2) of 1.20 metres and placed the larger of lengthening bars (4) in front of the stalls.

The support allows the filling up to be pursued a greater distance, and we have therefore four courses of lengthening bars, 1, 2, 3 and 4. Before retiring, the day shift of miners set a course of lengthening bars in the last section which is not embanked. At the following "shift," the way cutters having made the wall prepare to fill up the section 1-2. In order to do that they must knock down the timber intervening between the lengthening bars 1 and R; then they prepare the filling-up just below the lengthening bar, 1; they fell down the end props of this lengthening bar, and draw out immediately props and bar. They then finish the filling-up firmly as far as the vicinity of the lengthening bar, R; prepare it under this one, then take it away in the same manner, and lastly continue the filling-up as far as the lengthening bar, 2, which will become lengthening bar 1 for the next shift. The different phases of the work are represented by figs. 2 and 3. In reference to the first case the method of untimbering is based on the following rule: Never take away a lengthening bar before the filling-up has been properly done up to that bar and has been prepared below it. The operation of untimbering conducted in this way cannot fail. Besides, the security of the miners is complete, for the distance which separates the lengthening bars 1 R and 2 being 0.60 metre at the most, the miners are never exposed to a portion of roof which has been deprived of support.

Second Case.—This is one that is met with most frequently. The work of the miner is the same as in the first case, with the exception that he will have to put a casing to the roof. At the night "shift" of miners, fillers-up commence to take away the immediate props of 1 and R. Nevertheless, if the ground is too bad they will not take away the props of R until the second phase of the work. Next, they prepare the filling-up as far as below lengthening bar R. They knock down the end timbers of 1, complete the filling-up as far as the vicinity of R. Figs. 4 and 5 give the first phase of the work.

They next prepare the filling-up as far as below 2 (the intermediate props of R having been taken away) then they take away R as before, and fill up firmly as far as the vicinity of No. 2.

FIG. 5. SCALE $\frac{1}{10}$.

At the next shift when taking away 2, it is possible to pull out the greater part of the ashler pieces which rest on Nos. 1 and 2. In this case the rule to observe is—never take away a lengthening bar before having filled up as far as this bar, and having prepared to fill up as far as underneath the following lengthening bar.

Third Case.—When the opening of the bed is such that the cutting of the way is of no use or furnishes soil in insufficient quantities, and which, moreover, cannot be supplied by earth used for keeping in repair, one is obliged, in order to fill up the stalls, to bring down, at great expense, earth from the surface. Then the work of untimbering is of the same character as in one of the cases which we have just described. But, if circumstances will not allow the owner to work profitably by means of embanked stalls, then he has recourse to cutting out the coal so as to leave behind gaps made by working. This is usually called working by blasting. The Baily method has the advantage of immediately causing the blasting, and of not leaving behind immense open spaces, which are the cause of many inconveniences well-known to the miner.

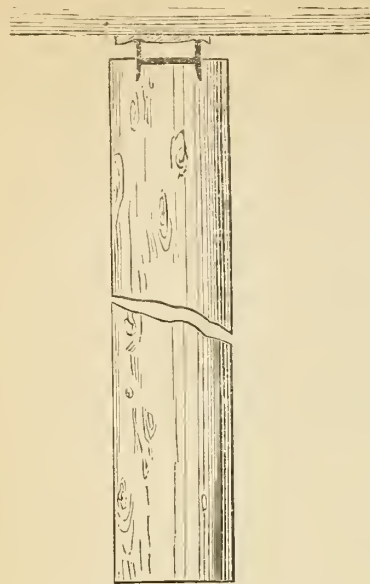
The work of the miner is still the same as in the preceding cases. As for the untimbering, it is done by a company of special workmen. This work evidently demands a certain dexterity. The men engaged in untimbering first place before No. 2 a double lengthening bar R supported by five props (fig. 6). This lengthening bar is not indispensable, but the placing of it is so rapid that it is best to use it. The object of this lengthening bar is to limit the breaking of the earth at the moment of blasting; besides, after taking away No. 2, it will sustain the ends of the following section. They next place the wooden lengthening bars R 2, 50 metres and supported by three props. The last named and the corresponding lengthening bars are provided with small cords, which hang down in the stall. The men then knock down the intermediary props, 1 R and 2: then, standing in the ways, they bring down the end props and pull out all the pieces quickly. For several instants the wooden lengthening bars will sustain the roof of the whole section. In order to avoid this last support being broken and lost in the crush or fall, they hasten to bring it down by means of tools with long handles, and seek to save the timber by pulling the small cords. This last operation often succeeds, but M. Baily does not consider the untimbering a failure if several pieces are lost in the falling of the earth. The rule for security in this third case is that the pulling down of the iron lengthening bars and their props may not be proceeded with until an immediate fall of the roof is provided against by means of a secondary form of support in timber. Also in certain kinds of ground it would be well to limit the breaking of the roof by a double metallic lengthening bar strongly propped. We have taken for an example the work in an upright stall. The methods followed in the inclined stalls are the same with the

exception that in steep inclinations the embankment is graduated in the plane of the bed, making it at the bottom of the stall the width of the whole of the section. The stability of the embankment is in this way better assured. It is seen by this description that the support which was formerly lost may now be drawn out. The stalls produce, however, a little loss. For instance the wood will break under the pressure. The lengthening bars will crack to the right of the wood. In the last case they are cut and made to serve as lengthening bars for the way. For all that, the loss is but small. The stall ways will demand but little repairing, thanks to the resistance of the lengthening bar, and to the rule prescribed by M. Baily to shave off the bottom of the timber diagonally. This method of untimbering has been applied for nearly six months in the coal mines of Marles, and has there yielded splendid economical results; and what is also of importance wherever the Baily system of support has been adopted, they have had neither accident nor falling-in where previously they were rather frequent. This seems at first sight paradoxical, and yet it is only natural. In stalls filled up by the old method, the ground always gives way before the complete collapse of the supports, which are buried there. The consequence is that it leaves several sections behind, between the roof and the embankments, an open space which occasions at first loss of air, and is then the cause of falls reaching as far as the front of the stall. By the complete untimbering the fall of the roof on the embankments is occasioned immediately; the settling down is more complete; the loss of air and the subsequent falls are avoided. It is not surprising, then, as we have seen at Marles, that ground which has formerly been known as very bad no longer bears that character in the stalls which are worked according to the Baily method. For instance, the Rosalie seam 0.90 metres in thickness, was absolutely unworkable, as the roof of it was so shifting. Thanks to the Baily

system, several working places have been established there, which are regularly worked, and the support of which only costs 0.30 fr. per ton. The use of this method is advantageous in cutting the coal. In the Therese seam, which is 1.60 metres in width, and which is worked by blasting, the price of cutting, which previously was as high as 0.60 fr. per truck, has gone down at the three last payments to 0.40 fr., 0.41 fr., and 0.42 fr., or 32 per cent. reduction. In the embanked stalls, the price of cutting has diminished generally 10 per cent., or about 1.25 fr. per ton. This abatement is explained first by the suppression of the working and transport of the timber. Next, by greater facility in the work of the miner. In reality, he feels more secure in the stall, and slightly forces the progress of it; he is less inconvenienced by the propping, which is reduced to two-thirds, and has greater facility for hewing the coal. He is not compelled to leave his work a dozen times in order to strengthen the support which is giving way, and his task is more easily achieved. The price for the cutting of the ways has not changed. If, on the one hand, the untimbering is an additional trouble, on the other hand the embanking following the face of the work at greater intervals, is no longer limited by carefully constructed openings. The price of placing the frames for the way has diminished from 1.20 fr. to 0.95 fr. It is not to be doubted that increase of production procures economy in the other services of the mine. But the greatest economy results from the untimbering and from the decrease in the cost of repairing the ways. It varies with the nature of the surrounding ground and the thickness of the seams. In good ground there will always be economy, but it may be very small; nevertheless in such a case the Baily system of support would not be the less to be recommended. In reality, less woodwork is put to good ground, and the miner is often surprised by accident. The Baily lengthening bar will prevent these, and it is therefore a great advantage. What does it matter if the system of support be rather more complicated than the simple head props when the former may be drawn out while the latter are lost? In bad ground, on the contrary, a saving of 70 to 90 per cent. may be made, as has been the case at Marles in certain stalls. Generally it may be estimated at 50 per cent. At the St. Emile Pit all the stalls are actually provided with the Baily form of support.

The following comparative table shows the consumption of wood at this pit both before and

FIG. 6. SCALE $\frac{1}{10}$.

FIG. 7. SCALE $\frac{1}{10}$

after the adoption of this method of timbering :

Years.	Consumption per ton extracted.		
	Wood.	Iron.	Total.
1883	0.87	....	0.87
1884	0.85	....	0.85
1885	0.95	....	0.95
Average	0.89	....	0.89
1886	0.67	0.05	0.72
1st to 15th January, 1887..	0.72	....	0.72
16th to 30th January, 1887..	0.73	0.13	0.86
1st to 13th February, 1887..	0.50	0.24	0.74
14th to 27th February, 1887..	0.45	0.40	0.85
1st to 13th March, 1887....	0.43	0.37	0.80
14th to 27th March, 1887....	0.40	0.10	0.50
28th Mar. to 10th Aprl, 187..	0.49	0.01	0.41
11th to 24th April, 1887....	0.40	....	0.40

The average for 1883 to 1885 amounted to 0.89.

The Baily method was introduced at the end of 1886 in a certain number of stalls only. Just after the middle of January, at the end of the trial, all the stalls were successively fitted up. During this period the total consumption was but little reduced, owing to the fact that the working was entirely destitute of the necessary material, and that an iron lengthening bar naturally costs much more than a wooden one. The consumption of iron will remain relatively important, for some time yet, for the ways absorb a good deal. Nearly all the stalls are upright, and when several have reached a certain height, and their ways can be untimbered, then the expense in iron will be minimized. At present the expense is no more than 0.50 fr., in spite of the use of a form of support, which is at first rather costly. It is estimated that in the making of new stalls the total cost would not go beyond 0.30 fr. or 0.35 fr. We consider these estimates as well founded.



Markets.

The English and Continental markets are fairly firm, and sales could no doubt be made at the moment at 11½d. per unit, with one-fifth of a penny rise for 80% guaranteed, 9½d. for 75% and 8½d. for 70%, ex-ship Thames, Mersey or Clyde. Charleston River phosphate is at present being quoted at 8d. per unit, which is 1d. better than a few months ago. We do not look for any great change in the above figures.

Freight.

Freights are at present about 7s. to 7s. 6d. to London, and 6s. 3d. to Liverpool by regular liners, but less would no doubt be accepted by the "tramps." Tonnage to Hamburg is quoted from 10s. to 12s.

Shipments.

The following are the phosphate shipments from Montreal for month ending July 10th, 1888:—

Date.	Ship.	Destination.	Shippers.	Tons.
June 15	Wandaham	Hamburg	Wilson & Green	168
" 22	Govino	London	Lomer, Rohr & Co	481
" 23	Lake Winnipeg	Liverpool	Millar & Co	300
" 30	Fleming	London	Millar & Co	318
" 30	Lake Superior	Liverpool	Lomer, Rohr & Co	100
" 3	Grasshopper	Hamburg	Wilson & Green	149
July 4	Oxenholme	Liverpool	Lomer, Rohr & Co	657
" 6	Cynthia	Bariow	Lomer, Rohr & Co	150
" 1	Cuce	Glasgow	Lomer, Rohr & Co	150
Total				2,472

RECAPITULATION.

SHIPPERS.

Lomer, Rohr & Co	1 180
Wilson & Green	974
Millar & Co	318

DESTINATIONS.

Liverpool	1,057
London	798
Hamburg	317
Bariow	150
Glasgow	150

In General.

Dr. Saunders, Director of the Central Experimental Farm, writes to us as follows regarding the experiments at present being made by the Government in the matter of phosphatic manures:—"The experiments with phosphates consist of tests of the fine ground apatite applied to plots of wheat and corn, the apatite in its crude state being used alone on some plots, on others apatite mixed with nitrate of soda, and on others with nitrate of soda and wood ashes. Similar experiments and combinations are being tried with the treated phosphate, that is to say, superphosphate, made from mineral phosphates. It is proposed that these experiments should be continued year after year on the same plots of land with the same fertilizers, and it is to be hoped that a few years' trial will suffice to determine with some measure of accuracy the actual benefit to be derived from each application to the crops under treatment. Another year we shall apply these fertilizers also to experimental plots of grasses, roots, clovers, etc., and also endeavor to test the value of these fertilizers by such other methods as may suggest themselves. I shall be glad at any time to give you any further information you may desire on this subject, and regret that I have been unable to furnish you with this information earlier."

South Carolina's mineral production consists chiefly of phosphates, and the output of the mines last year was more than three times as great as the value of all the precious metals produced in the Southern States for the same period. Phosphate mining was unknown in 1860. In 1870 the production of rock was 19,989 tons, in 1880, 150,162 tons, and in 1887, 432,757 tons. About 200,000 tons of this rock was manufactured into fertilizers in the United States, and the consumption of fertilizers in South Carolina has increased from 70,000 tons in 1880 to 96,000 tons in 1887, and it will doubtless reach 120,000 tons in 1888.

From Bulletin No. 4 recently issued by the Department of Inland Revenue it is evident that the trade in fertilizers is steadily increasing

in this country, as 40 samples have been sent in for analysis. In 1886 the number was 27, in 1887, 31. In spite of the 20 per cent. import duty levied on fertilizers it appears that foreign manufacturers have furnished 17 of the 40 samples for 1888. These come chiefly from the States, and are imported into the Lower Provinces. From this it is plain that the farmers there are not particular to local manufacturers. The fertilizers offered by the latter are just as high in price as those from the States, but do not test nearly as high in ammonias, phosphoric acid and potash. On the other hand the Ontario manufacturers offer goods of much better quality, generally superior to those imported from the States, and at lower prices. It would consequently appear that an excellent market for the fertilizers made in Ontario might be opened up in the Lower Provinces if the manufacturers would only send their travellers there.

The Fertilizers Act requires that every ammoniated superphosphate shall contain at least 5 per cent. of soluble phosphoric acid and 2 per cent. of ammonia, and that every acid phosphate or dissolved bone shall contain at least 8 per cent. of available phosphoric acid. An inspection of the figures in the table given shows that five fertilizers do not come up to the standard, and consequently their sale at any higher price than \$10 per ton is illegal. One of these five is made in Ontario. In a former report, dated 20th December, 1886, attention was called to the large amount of money which farmers pay for the ammonia in these fertilizers, and which might be saved if sufficient care were taken to preserve that contained in barnyard manure.

A rumour that judgment had been given in the case of *Fraser versus the Queen* is untrue. Judge Burbridge's verdict will not be made public until September.

Du Lievre.

Everything is going along very well and great progress is being made with the improvements at the Canadian Company's mines. The tram-line is nearing completion, and will be in working order by 1st August. The steam tug "River Belle" has been purchased, and fitted up with new machinery will commence hauling in a few days. The construction of the large new cobbing house is also completed, and the new machinery for it will be in place and in full working order by the end of the present month. The output from the pits has increased considerably, and Messrs. Millar & Co. inform us that the weekly average output may be fairly stated as 140 tons per week. About 80 men and boys are employed.

Mr. T. Lanson Wills, who has been sent out from England to manage the mining branch of the Company's business here, has taken up his residence at the mines. He is a chemist who has had much practical experience in phosphate mining at Bordeaux and the West Indies.

The Government Geological Survey is making rapid progress with the topographical work of this district. Mr. White and his party are now located as far up the river as the High Rock mines.

Mr. S. P. Franchot has some thirty men working on the Central Lake Mines. A number of pits have been opened, and the output of ore is fair.

Development work at the Little Rapids Mines continues with very favorable results. A new show of high grade ore is reported to have been uncovered since our last.

The Phosphate of Lime Company have already shipped close upon 4,000 tons from their High Rock Mines. A little over 3,000 tons of this has been "firsts," shipped on contract to Europe, while the remainder has been forwarded to U.S. points. 160 men and boys are employed. The large tunnel (No. 11) continues to yield a large output. No. 29, an open cutting made this season, has also proved very productive. Some half dozen new shows are also being worked on a small scale, but insufficient machinery at these places greatly hinders the work of development. The tram line has undergone much improvement since last year, and at the terminus a "cutoff" and pier has been constructed to facilitate the handling of their second quality output. A large number of new buildings have been erected for the accommodation of the miners and their families, a new storehouse is being built, the general offices rearranged, and altogether many improvements are apparent at these ably managed and well conducted mines.

We regret to state that an accident, which resulted fatally to one of the miners, occurred this month in No. 29 pit. The unfortunate man was struck on the head by a piece of rock being hoisted by the derrick and died a few days later. This is, we believe, the first fatal accident at High Rock.

The North Star Company have some extensive improvements in contemplation, including the construction of a tramline from pits to the landing, and the erection of a crushing mill at the latter point. A fair average output is being maintained.

The Emerald is still yielding good ore, but the output is comparatively small. A rumor is current in Buckingham that these mines have passed into the hands of the High Rock people, but so far we have been unable to get any confirmation of the statement.

The water in the river has fallen to such an extent that only lightly laden scows and small steamers can get over the Little Rapids. It would appear that navigation at this point (L. R.) has been somewhat impeded by the work constructed last summer. As yet no recommencement of the work has been made, but it is said operations will be resumed in two or three weeks.

Templeton District.

Mr. Jackson Rae is working in a small way on his property.

The Templeton & Blanche River Company continue to meet with an encouraging output at their mines. Mr. Trimble, the Managing Director, is now in Great Britain, it is said, with the object of placing the property in the hands of a larger syndicate.

The Blackburn Mine is working briskly with a large force. Several thousand tons of ore have been shipped. An inclined shaft, to be operated by wire rope plant, is in course of construction. Mr. Blackburn states that he is well pleased with the appearance of the mines, and regards the daily output as very satisfactory.

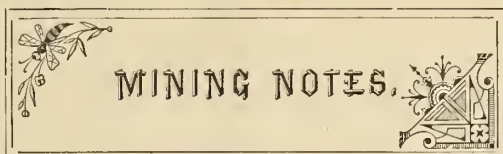
Perth District.

Work on the Anglo Canadian Co.'s Mines at Bobb's Lake and Otter Lake is being vigorously pursued upon the contract system, and considerable quantities of ore are being taken out.

The Foxton mine is looking very well. The shaft is down about 94 feet, and the vein continues to improve in size and quality. From 3 to 5 tons per day is being taken out with a force of about ten men.

Kingston District.

The Stornington Mining Company have shipped 376 tons of No. 1 to Hamburg. The operations of the Company have been seriously retarded by the recent destructive fire which completely destroyed their boarding, clobbering and engine houses and office.



We shall be greatly obliged to mine owners and superintendents for such authentic reports of their operations as may concern shareholders and the public.

Nova Scotia.

There is a good prospect of recovering No. 2 Slope at the Albion Mines, where the explosion took place in January last. A pit was sunk 40 feet on the cross-cut between No. 1 and 2 slopes and the roof blown down; an exploring party descended No. 2 slope and for a short distance into No. 1, encountering heavy falls in No. 2, some of them 30 feet high. No. 1 is very hot, and is no doubt still on fire. A permanent stone wall between the two slopes has been built, and the work of cleaning up and retimbering No. 2 is being proceeded with. A small winding engine has been erected in place of the one lost at the fire. It is thought that coal will be coming out of No. 2 pit by the beginning of the year.

At the Foord pit pumping is still going on. Cages are now down to the rubbish at the bottom of the shaft, and the pumps will now have to be set to work there in order to remove the balance of the water. It will be a long time yet before any coal can be mined in this pit.

At the new "English" slope operations are proceeding fairly well. The sinkers have got through the "step," which proved to be a downthrow of some 22 feet, and the coal is recovered on the other side. Considerable bottom will have to be taken up for a distance of one hundred feet on the angle of the slope in order to get below the step. The slope is down some 150 feet, but the total depth when finished will be in the neighborhood of 1,300 feet.

Work has only been fair of late at the Drummond Colliery, mainly owing to want of tonnage, but when pits did work a very large quantity of coal was shipped. Some large "Time" boats are used this season by the company, but it is found that the smaller boats are more profitable and convenient.

Scarcity of tonnage to carry coal for Upper Province orders has also had a depressing tendency on work at the Vale Colliery. The management employ very large boats—some of them over 3,000 tons—to forward their output. The new sinking in the McBean slope is going

down well, and the coal maintains its usual good quality. The company are now supplying the St. John Mills, as well as the Steel and Forge Companies at Trenton. At the "Six Foot" seam work is progressing as usual.

The Black Diamond Colliery is working full blast, and 75 tons a day are being raised. Sufficient orders have been obtained to keep these mines busy all season. We understand that some 20,000 tons of Intercolonial Railway contract have fallen to the share of this company.

At the Acadia Mines work has not been up to the usual standard, and about three-quarter time only is made.

The Intercolonial contract for 200,000 tons of coal has been let, but little or nothing is known here about the awards, beyond the fact that very little of it has come to the Pictou County Collieries. In a district where so many people are dependent upon the coal industry for their livelihood, this result is much to be regretted and will be keenly felt.

The following are the official returns for the month of June, so far as received at the Mines Office:—

District.	Mill.	Tons	Oz.
		Crushed.	Gold.
Sherbrooke.....	Miners.....	200	41
Salmon River.....	Dufferin G. M. Co's...	850	220
Waverley.....	McClure.....	118	47
".....	Wallace.....	65	10½
Lake Catcha.....	Oxford G. M. Co.	144	220
".....	" (Anderson).....	33	23
Whiteburn.....	Whiteburn G. M. Co..	61	112
Fifteen Mile Stream.	Egerton G. M. Co.....	220	102
Oldham.....	Oldham G. M. Co.....	95	62
Caribou.....	Moose River G. M. Co.	162	79½
".....	D. Touquoy.....	444	248
Stormont.....	Hurricane Tributaries...	152	190½
Renfrew.....	Empress.....	100	42
Wine Harbour.....	Napier.....	70	58

The Edgerton gold mine is looking up. 102 ounces was brought in last month for 15 men. This is a very good showing. There are lots of other equally good properties awaiting development. All that is wanted is good honest practical management and a little capital.

At the "Board Camp," Sheet Harbor, prospecting is being pushed forward with vigor. A crusher will shortly be added to the plant. Some very rich leads have been found in this locality, but parties are very reticent about their finds. New Glasgow people have taken up one hundred acres in the district, and four good leads are reported on the property. If this is so a boom may be looked for at "Board Camp."

The new crusher at Moose River gives every satisfaction. Mr. D. Touquoy has brought to Halifax three bars containing 332 ounces from about 400 tons of quartz, the produce of four months' work.

Mr. McKam and his syndicate are expected in a few days to look over the iron ore deposit at East River. Considerable work has been done uncovering the leads and making a good show of the different beds. The quality of this ore is unsurpassed, being brown Hematite, carrying over 70 per cent. of metallic iron. Report says that Mr. Bennett, of New York, is one of the principals of the syndicate.

At the Gowrie Mines, C. B., work is not so brisk as in recent years; only four boats are kept running as against six last year, and consequently the men are losing between five and six days in a month.

The Nova Scotia Steel Company, with headquarters at New Glasgow, are applying for supplementary letters patent increasing their capital stock from \$300,000 to \$1,000,000, and extending their power so as to enable the company to manufacture steel and iron in all their branches, and articles consisting of iron or steel, in whole or part; and changing the name to the "Nova Scotia Steel and Forge Company (Limited)."

The *Critic* states that "the recent forfeitures of gold-mining properties made by the Hon. Commissioner of Mines has caused quite a brightening up of titles, and many owning property in other districts are looking to see if their districts are to be called up soon. Many are saving themselves from the stroke of the lash by surrendering their old leases and taking out new titles. Let the cleaning-up process go briskly, and have the anxiety over."

New Brunswick.

Manganese mining is being prosecuted with considerable success by the Manufacturing Mining Company of St. Martins, N. B. Good pockets are being discovered in the various drifts opened, and the ore is of first-class quality and considerable in quantity. It is believed this is one of the most valuable manganese deposits in the Maritime Provinces, and its owners intend energetically prosecuting its development.

Quebec.

Mr. H. A. Church, of Chelsea, is doing some development work on his mica property.

On that portion of the Bell Company's property known as the Hayden Estate, in Coleraine, roads are being made and a large number of buildings are being erected. A gang of miners will be at work in a few days. The Belmina portion of the estate will not be touched this year. Altogether the prospects of the Bell Company are most favorable.

The Johnston Co., Wards, Ross Co., and King Bros. are all doing a good business, shipping large quantities of ore by Boston to United States and European points.

The new crushing and cobbing machinery erected by the Scottish Asbestos Company is now in complete working order, and a test on an extensive scale is to be made this week. If successful similar machinery will be put up at the Thetford Mines. All the large dumps there will then be worked over, and it is thought that a very large quantity of asbestos, which at present does not pay to cob by hand, will be reclaimed.

The Scottish Canadian, Anglo Canadian, Frechette, and Danville Mines are all busy and making a fairly good output.

The Harvey Hill Copper Mines in Leeds are being more systematically worked, and are yielding a fair quantity of first class ore, some of it assaying 70 per cent. metallic copper with a good proportion of silver. English experts, who examined the mines during the past month, say that they are well pleased with the appear-

ance of the property. Our correspondent adds that it is understood that several hundred men will be immediately put to work to open up the property on a large scale.

The rumour that Mr. J. N. Greenshields, of Montreal, and other capitalists, had sold their copper property in the Eastern Townships is premature. Negotiations, however, are in progress for a transfer of the property, and full particulars will be given when the transaction is complete.

Captain Bothwell has resumed the developing of his gold property on the Du Lievre. A gang of men are at work in the pit, which has now attained a depth of twenty feet. The present appearance of the mine is very promising. Farther assays will be made by Dr. Donald in a day or two.

By a fall of rock at the New Rockland slate quarries, on the 14th instant, one man was killed and two others slightly injured.

A new find of asbestos is reported to have been made in the Township of Portland, near the High Falls. The indications point to an abundant supply of the mineral. Samples before us show a fine silky fibre, from a half to two inches in length. Mr. W. A. Allan, of Ottawa, has secured the mining rights to what, to all appearance, is a very valuable find. A number of men are presently at work developing the property.

An important discovery has been made in Garthby, on the property of Mr. Wm. Farwell, Manager of the Eastern Townships' Bank, Sherbrooke. The large deposits of iron pyrites and copper found on Lot 22, 1 Range, North, and so favourably reported on by Sir Wm. Logan (Geol. of Canada, 1853), has been traced for nearly two miles in a south-westerly direction to the Township of South Hann. This is most important, showing as it does that a true vein exists at this point. Eleven openings have been made on the strike of the lode, all showing rich ore.

The greatest activity prevails at the various asbestos mines. The demand for the mineral continues good. Parties are buying up all the small lots of "seconds" and "thirds" as they cannot get any of the first quality, all of which was contracted for last winter.

The Bell Asbestos Company (Limited), of London, England, are taking out of their Thetford Mines, on an average, sixteen tons of "Firsts" per day. About one hundred men and boys are employed. A large number of new buildings are in course of construction, and the mines are being equipped with an extensive plant and machinery, which is expected to be in full working order by the 15th of August.

Ontario.

The Thornbury Oil and Mining Company, which was formed in November, 1886, by seven of the business men of Thornbury, Ont., commenced boring about four miles from there a couple of weeks ago, and are now down about 500 feet. A very strong flow of natural gas has been struck, and it is estimated that at least 2,000,000 cubic feet escapes every 24 hours, or enough to supply a town of 20,000 inhabitants with light and fuel. It is the intention of the company to sink a well for gas in Thornbury immediately where the formation

is the same as where operations are now being carried on. The present well is on the grounds of a summer resort, and the gas can be utilized to light the hotel and grounds and greatly enhance the beauty and value of the property. The company have the exclusive right to bore over a large tract of country where the indications seem to be of the best.

The Grand River Plaster Company having decided to establish calcine works in connection with their business at the gypsum mines, two miles from Cayuga, a kettle is to be put up capable of turning out from seventy-five to one hundred barrels of calcine per day.

The Terra Cotta Company is a new concern recently formed at Milton, Ont., with a capital stock of \$20,000, for manufacturing terra cotta, pottery and other goods, of a new kind of clay recently discovered near that place. This clay is of two colors, and is said to become almost as hard as stone when exposed to the atmosphere.

Nothing in the way of mining is being done at the Bristol Iron Mines, pending the construction of a branch railway from the Pontiac P. J. Railway from Wyman's Station to the mines. The engineers have located the road, and this week about seventy men have commenced grading. Next week about 300 men are expected to be on hand. It is thought that in about six weeks the road will be ready for rails.

The *World* is our authority for the following: A wealthy syndicate of Milwaukee and Chicago capitalists have purchased over a thousand acres of mining lands near Goulais Bay, and about fifteen miles west of Sault Ste. Marie. They commenced exploratory work last fall. They encountered a vein of mineral and have gone down on it for about ten feet and an average sample of the rock taken from it at this depth assayed \$17 in gold to the ton. The rock is of such a soft character that it can be crushed with proper machinery and the mineral separated, on a large scale, at from \$3 to \$4 a ton. Gold has also been found in a rich silver vein at Gros Cap and in the copper ore of the Korah mountain mine, both near the Soo. Silver ore seems to be the predominant mineral of the district. At Gros Cap a very large vein can be traced for a mile or more, which carries a large percentage of silver.

Progressive Age states that Mr. C. A. Ashburner, the Pittsburgh geologist, has gone to Ontario to explore a natural gas field for a Canadian company. He will locate the wells, and they will be drilled under the direction of the Fuel Gas Company of Pittsburgh.

Sudbury District.

Work at the Vermillion Mining Co.'s property is progressing at both shafts. At No. 2, or the shaft in quartz, a depth is attained of about fifty feet, and some drifting has been done at the forty feet level. Many beautiful specimens have been taken out at all depths, and the general output carries a good value in gold. No addition has been made as yet to the three stamps. The shaft known as No. 1 is now over thirty feet deep, and of very large proportions. At the bottom a very peculiar ore, or rather mixture of ores, is found. Lying side by side are good chalcopryrite, a mineral that appears to be half way between millerite and pyrites; and a peculiar deep purple ore, containing 30 per

cent. copper. This latter carrying a little gold and some rare metals of the platinum group, besides Tellurium.

Mr. McKenzie is here at present, and among other duties will examine Lot No. 7 of Con. 4, in Denison. He is not yet prepared to develop veins on this property, but before long will have men at work there. The veins of the Vermilion Mining Co. cross this lot.

The McConnell copper belt, we regret to say, lies idle, the owners, instead of developing this promising property, and proving its value, preferring to sit and wait for some one to pay them a big figure for it undeveloped.

In Lorne your correspondent has washed gold from quartz in two lots, and found an average sample from one vein to carry about four ounces of gold per ton. From another vein he selected stuff yielding over one hundred ounces of gold per ton. This was taken from the crevice between vein and hanging wall.

The Canada Copper Co. have twenty-five men at work at the Stobie Mine. They are clearing the hill, and will quarry from the level of the track, removing the hill for some distance.

At the Copper Cliff and Eyre Mines work progresses as usual, and a fine stock of good ore is being accumulated for the smelting plant. Ground is being cleared for the smelting plant, and everything points to an early start.

A mile and a half from the Stobie Mine, to the north, is a most promising copper mine, which your correspondent had the pleasure of visiting recently. The body of copper appears to be of great extent and appears at the surface throughout the length and breadth of the hill, for 250 by 400 feet.

Port Arthur District.

News from this quarter for the past month has been of a most encouraging nature.

The Beaver mine has just placed in position a new hoisting apparatus of an improved pattern, and everything is working in a most orderly and satisfactory manner. The ore being taken out at present is of a low grade, with occasional rich streaks. Improvement is visible everywhere, both inside the mine and out.

The Badger Mine, about one mile from the Beaver, is at present taking the lead as regards rich ore. The output is almost all bonanza ore.

\$10,000 to the ton is quite common. The silver generally occurs as a sulphide, but some of the choice pieces are fairly saturated with native silver. The management have just completed a good waggon road to connect with the Beaver Mine. The mill will probably be complete in six weeks—considerably in advance of the requirements of the mine, which is not by any means in shape to keep a mill supplied.

The "Shuniah Weachu" or Silver Mountain East End Mine is now turning out good milling ore from the four hundred foot level in No. 3 shaft, where the vein is now twelve feet wide. Under the able management of Capt. Thos. Tretheway the company have at last succeeded in finding the extension eastward of their main vein on the lower ground near the eastern boundary of their property. Where found it was being augmented by another vein running north-easterly, each vein being about four feet wide, and carrying ore ranging from \$10 to \$500 to the ton. The vein carries a large percentage of zinc blende associated with galena and iron pyrites. The junction of the two veins, it is expected, will give a large quantity of very rich ore, and as the vein is easily accessible and in the vicinity of the compressor, it is likely that development will be pushed vigorously, the cost of extraction being inconsiderable.

The "West End" Silver Mountain Mine is being put in shape with vigor and skill. The principal work consists as yet in the erection of suitable buildings for a large force. What little work has been done in the vein, where a bed was being prepared for the shaft house, has revealed very rich ore. This shaft is a continuation of a pit from which a ten ton test gave \$160 to the ton. As the vein is well situated in a side hill a great work will be done so soon as mining is in full swing.

The last candidate for publicity is the Caribou Mine under Capt. Rothwell. The vein has been struck in the lowest tunnel on the side hill and some very fine ore extracted at the first shot. The management are enthusiastic over the strike, and the growth of this new but most promising mine will be watched with much interest. It is situated a short distance south-west of the Beaver Mine.

A good waggon road has been built from Whitefish Lake to 264 T, which is worked by the West End Silver Mountain Co. Development is not yet begun; buildings are being put up and material collected.

Manitoba and North-West Territories.

Prospecting for coal is being conducted on the banks of the Assiniboine, a short distance west of Minnedosa.

At the Lake of the Woods work is still being carried on at the Sultana Mines. It is reported that an offer has been accepted for the claim, through Mr. A. Pugh, St. Paul, by which a company has been formed with a capital of \$2,000,000, and that half a million is to be paid to the present owners in cash, and that they are to be given another half million stock in the company.

A number of mining men are out making a survey of Quarry Island, which is immediately opposite the Sultan Island. They think the rich vein extends to it and are now at the necessary work preparatory to sending down an application for it.

St. Paul dispatches state that Mr. A. Pugh has returned from the Lake of the Woods, where he went to investigate the gold discoveries on an island in the upper part of the lake. In an interview he exhibited specimens of the ore he collected while there. In these specimens the gold is easily seen by the unaided eye, and the rock is free milling ore, none other being in sight. Other specimens taken from different parts of the island were sent to the State university, where they were assayed and found to contain \$286, \$462 and \$160 of gold to the ton of ore respectively, and a small per cent. of silver. This is very rich, the cost of reducing it being very small. Gold was discovered here several years ago, but until within a few weeks the land has been part of an Indian reservation, and consequently nothing could be done with it. But now the Indians have released it, and fourteen capitalists from Manitoba have obtained possession of 400 of the 450 acres in the island, and value the property in its undeveloped state at \$2,000,000. Mr. Pugh, Dennis Ryan, and other St. Paul capitalists, are now conducting negotiations with the owners of the property with a view to uniting with certain Chicago parties in the purchase of a half interest in the property and working it. Some years ago gold was discovered in the vicinity of the Lake of the Woods and a stamp mill was erected to reduce the ore. But after excavations had been extended below the water level refractory ore was found, which could not be reduced in this country, and was not rich enough to pay for shipping abroad. Even if this should prove to be the case with the island

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mine there is enough rock above the water line to make the fortunes of a hundred men, if the richness shown in these specimens continues. These are the words of Mr. Pugh. The rock on the island rises to a point of 100 feet above the water line.

A special general meeting of the shareholders of the Medicine Hat Railway and Coal Company will be held at Toronto on the 18th of August, for the purpose of authorizing the directors of the company to issue bonds of the said company, pursuant to section 93 of the Railway Act of last session, and also of the Act of incorporation of the said company, and ratifying any contract made for the construction of the said railway.

British Columbia.

At a meeting of the Selkirk Mining Company, it was decided to immediately proceed with the construction of an aerial wire tramway from the Lanark mine to the Canadian Pacific Railway, a distance of $1\frac{1}{4}$ miles. This tramway will be capable of delivering 60 tons of ore in 12 hours.

Exports of coal from the Nanaimo coal district for May were 26,946 tons, valued at \$134,730. One shipment of 1,415 tons was for Honolulu.

It is said that miners in the Yukon country, while working the placers, find large quantities of platinum, which they throw away, believing it to be of no value. Mr. K. Valentine, of Juneau, has been authorized to purchase a large quantity for an eastern firm, as a test of its quality. He will pay \$2 an ounce. Upon being tested and found to be equal to the best quality, a higher price most certainly will be paid.

From the accounts of the Vancouver Coal Mining & Land Company, Limited, it appears that the gross profit for the year 1887 was £15,461, and the expenditure £26,269, leaving a net loss of £10,808. The report to be submitted on the 29th instant states that the direct financial loss to the company from the explosion at the mine in May last was £11,066, which was less serious than the directors had anticipated. The contracts existing at the time of the disaster have nearly all been carried out, the purchasers having granted extra time for delivery.

New Process for Reducing Iron Ores.

—A process of reducing iron ores has been patented by Mr. Gustaf M. Westman, of Stockholm, Sweden. In addition to the reducing furnace, regenerating or carburetting furnaces are employed, with a circulating blast engine, affording means for reducing the ores by means of carbonic oxide, by passing the carbonic oxide through a charge of ore, drawing off the gases from the charge, and passing them over glowing coke, cooling the gases, and then superheating them, after which they are again passed over or through the ore to be reduced, thus saving fuel without injuring the quality of the product.

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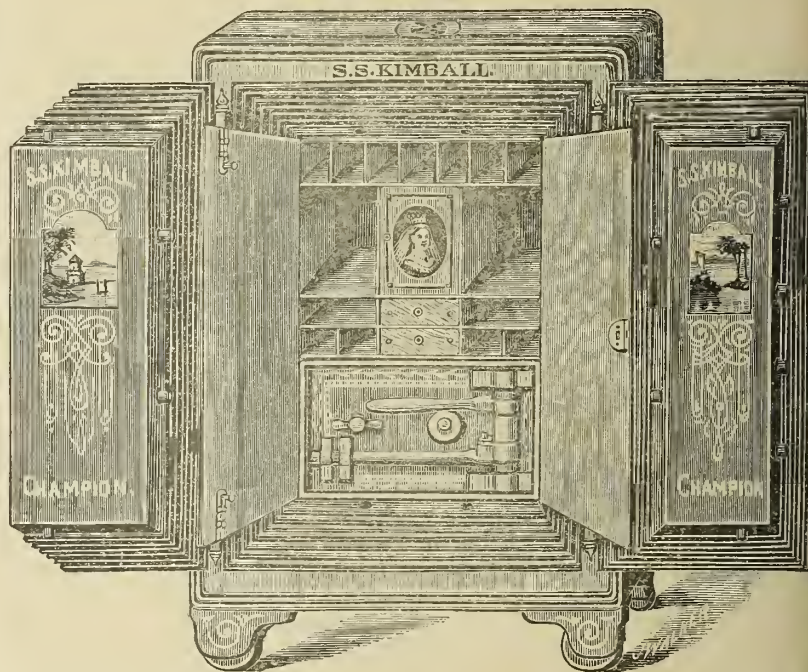
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Mining Regulations

TO GOVERN THE DISPOSAL OF

Mineral Lands other than Coal Lands, 1886.

THESE REGULATIONS shall be applicable to all Dominion Lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, iron or other mineral deposits of economic value, with the exception of coal.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein, either by surface or subterranean prospecting for mineral deposits, with a view to obtaining under the Regulations a mining location for the same, but no mining location or mining claim shall be granted until the discovery of the vein, lode or deposit of mineral or metal within the limits of the location or claim.

QUARTZ MINING.

A location for mining, except for iron on veins, lodes or ledges of quartz or other rock in place, shall not exceed forty acres in area. Its length shall not be more than three times its breadth and its surface boundary shall be four straight lines, the opposite sides of which shall be parallel, except where prior locations would prevent, in which case it may be of such a shape as may be approved of by the Superintendent of Mining.

Any person having discovered a mineral deposit may obtain a mining location therefor, in the manner set forth in the Regulations which provides for the character of the survey and the marks necessary to designate the location on the ground.

When the location has been marked conformably to the requirements of the Regulations, the claimant shall within sixty days thereafter, file with the local agent in the Dominion Land Office for the district in which the location is situated, a declaration or oath setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as aforesaid; and shall, along with such declaration, pay to the said agent an entry fee of FIVE DOLLARS. The agent's receipt for such fee will be the claimant's authority to enter into possession of the location applied for.

At any time before the expiration of FIVE years from the date of his obtaining the agent's receipt, it shall be open to the claimant to purchase the location on filing with the local agent proof that he has expended not less than FIVE HUNDRED DOLLARS in actual mining operations on the same; but the claimant is required, before the expiration of each of the five years, to prove that he has performed not less than ONE HUNDRED DOLLARS' worth of labor during the year in the actual development of his claim, and at the same time obtain a renewal of his location receipt, for which he is required to pay a fee of FIVE DOLLARS.

The price to be paid for a mining location shall be at the rate of FIVE DOLLARS PER ACRE, cash, and the sum of FIFTY DOLLARS extra for the survey of the same.

No more than one mining location shall be granted to any individual claimant upon the same lode or vein.

IRON.

The Minister of the Interior may grant a location for the mining of iron, not exceeding 160 acres in area, which shall be bounded by north and south and east and west lines astronomically, and its breadth shall equal its length. Provided that should any person making an application purporting to be for the purpose of

mining iron thus obtain, whether in good faith or fraudulently, possession of a valuable mineral deposit other than iron, his right in such deposit shall be restricted to the area prescribed by the Regulations for other minerals, and the rest of the location shall revert to the Crown for such disposition as the Minister may direct.

The regulations also provide for the manner in which land may be acquired for milling purposes, reduction works or other works incidental to mining operations.

Locations taken up prior to this date may, until the 1st of August, 1886, be re-marked and re-entered in conformity with the Regulations without payment of new fees in cases where no existing interests would thereby be prejudicially affected.

PLACER MINING.

The Regulations laid down in respect to quartz mining shall be applicable to placer mining as far as they relate to entries, entry fees, assignments, marking of localities, agents' receipts, and generally where they can be applied.

The nature and size of placer mining claims are provided for in the Regulations, including bar, dry, bench, creek or hill diggings, and the RIGHTS AND DUTIES OF MINERS are fully set forth.

The Regulations apply also to

BED-ROCK FLUMES, DRAINAGE OF MINES AND DITCHES.

The GENERAL PROVISIONS of the Regulations include the interpretation of expressions used therein; how disputes shall be heard and adjudicated upon; under what circumstances miners shall be entitled to absent themselves from their locations or diggings, etc., etc.

THE SCHEDULE OF MINING REGULATIONS

Contains the forms to be observed in the drawing up of all documents such as:— "Application and affidavit of discoverer of quartz mine." "Receipt for fee paid by applicant for mining location." "Receipt for fee on extension of time for purchase of a mining location." "Patent of a mining location." "Certificate of the assignment of a mining location." "Application for grant for placer mining and affidavit of applicant." "Grant for placer mining." "Certificate of the assignment of a placer mining claim." "Grant to a bed rock flume company." "Grant for drainage." "Grant of right to divert water and construct ditches."

Since the publication, in 1884, of the Mining Regulations to govern the disposal of Dominion Mineral Lands the same have been carefully and thoroughly revised with a view to ensure ample protection to the public interests, and at the same time to encourage the prospector and miner in order that the mineral resources may be made valuable by development.

COPIES OF THE REGULATIONS MAY BE OBTAINED UPON APPLICATION TO THE DEPARTMENT OF THE INTERIOR.

A. M. BURGESS,

Deputy Minister of the Interior.

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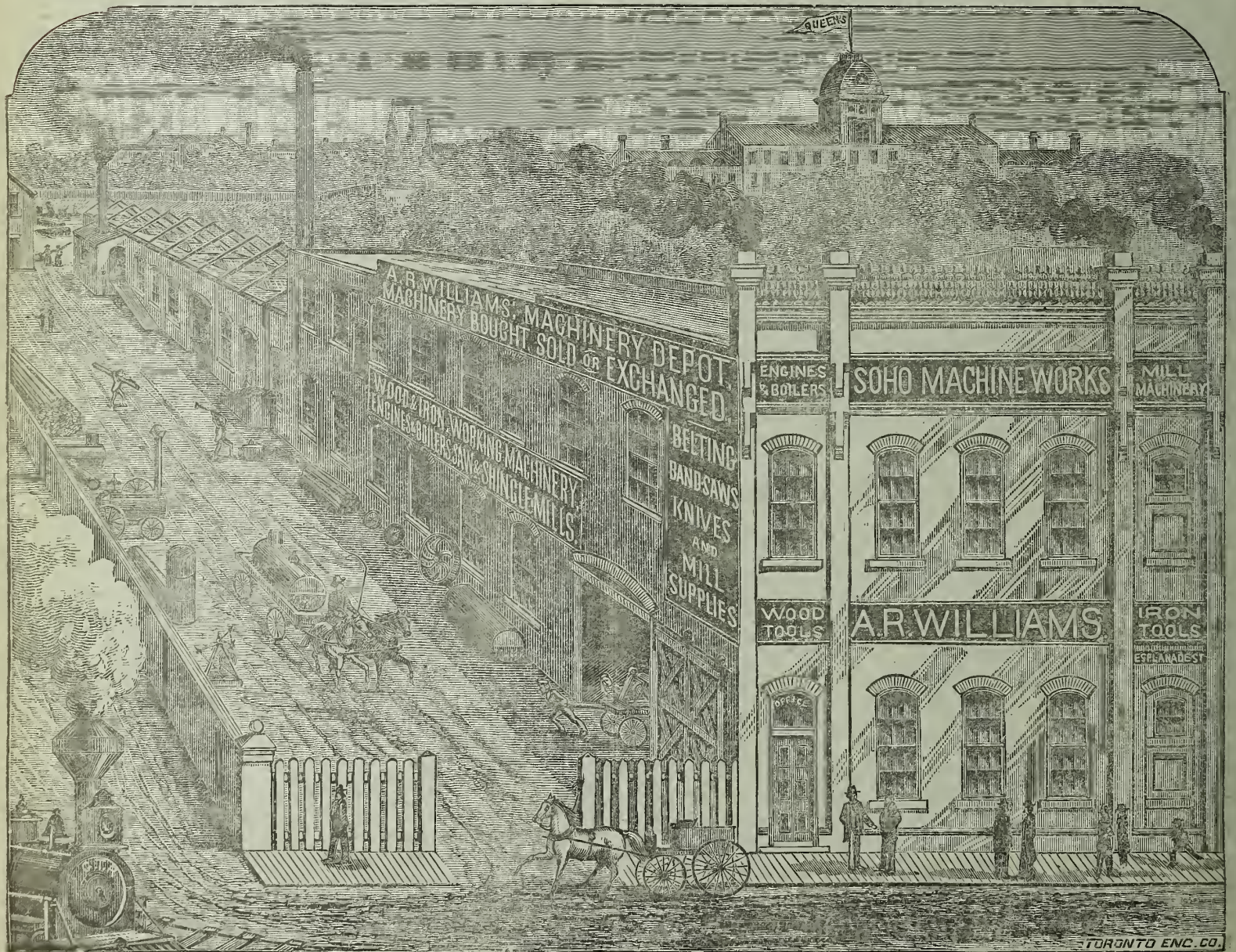
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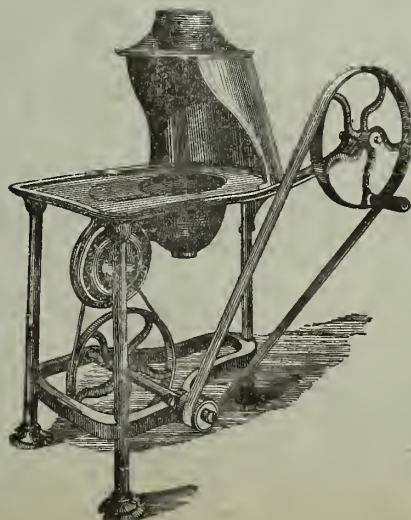
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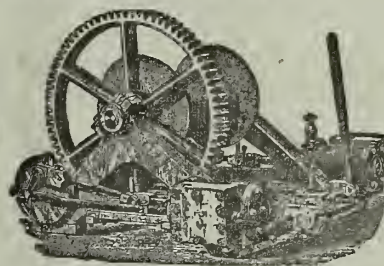
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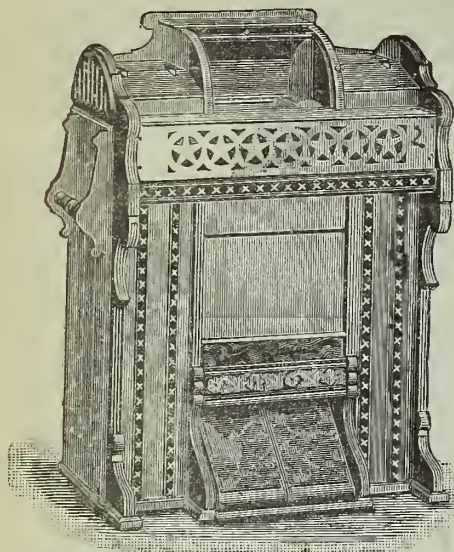
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Music specially prepared for Lodge Work, Churches and
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Will hold a Good Edge and Save Money
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The Canada Co.

Will issue Licences to Prospect or
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Mineral Reservations,

Covering nearly a

Quarter of a Million Acres

In Eastern Ontario, and principally
within the belts containing

Iron, Phosphate, Gold, Galena
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For list of lands and terms apply to the
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For lands in the County of Hastings and
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For lands East of the County of Hastings.

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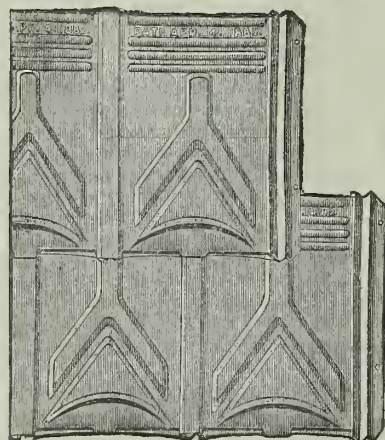
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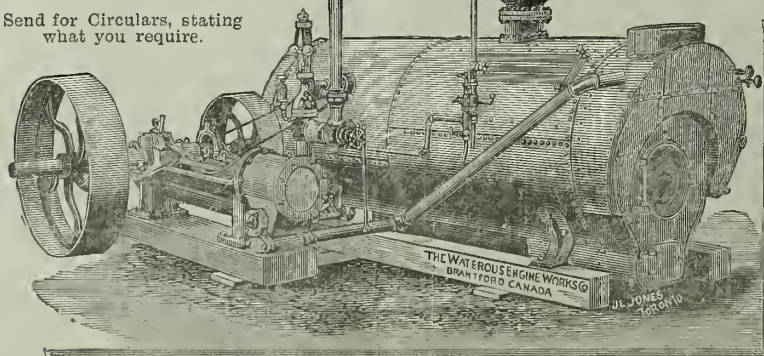
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ALL STYLES.

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what you require.



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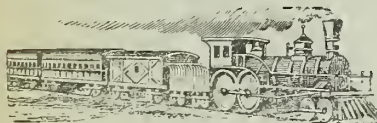
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Will examine Lots and Mineral
Properties.



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All points on the Lower St. Lawrence and Baie
des Chaleux, Province of Quebec; also, for New
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D. POTTINGER,
Chief Superintendent.
Railway Offices, Moncton, N.B.
28th May, 1888.

VALUABLE PLUMBAGO

AND OTHER

Mineral Lands FOR SALE,

IN THE TOWNSHIP OF BUCK-
INGHAM, COUNTY OF
OTTAWA.

1st.—Lot 28, in the 6th range, containing 100 acres, in addition to the salina of the lake.

2nd.—North half of lot 23, in the 5th range, containing 100 acres.

3rd.—Nine acres of lot No. 28, in the 5th range, with water privileges thereto appertaining, being site of mill dam, etc., etc.

The property formerly belonged to the Montreal Plumbago Mining Company, and was worked successfully for several years, until the company's mill was destroyed by fire, but the mill dam remains almost uninjured, and there are on the property several houses, sheds, etc., built for various purposes when mining operations were carried out.

The Plumbago Deposits

upon the property are regarded as amongst the richest and most extensive in the Dominion. As to the quality of the Plumbago, it has been extensively used in the manufacture of crucibles, lubricating leads, stove polish, etc., etc., and given unbounded satisfaction. This is established by the experience of consumers, and by a certificate from the celebrated Batterssea Crucible Works, London, England, a copy of which is open for inspection.

MICA

has also been discovered in quantities.

The lands are in the Phosphate region, and recent prospecting has disclosed a rich and extensive deposit of this mineral. There are unrivalled facilities for transporting the ore to and from the mines by the Ottawa River and C. P. Railway. Distance from mines to Railway Station 6 miles. Good road.

All that is required to make these valuable mines handsomely remunerative is a little capital and enterprise.

The Title is Indisputable.

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THE CANADIAN MINING REVIEW,
OTTAWA.

FOR SALE. VALUABLE Copper Mining Properties

— IN THE —

Eastern Townships

TOWNSHIP OF ASCOT.

- 1st. Clark Mine, Lot 11, R. 7 Ascot 187 acres
2nd. Sherbrooke Mine, part Lots 12 and 13,
R. 7 Township of Ascot..... 329 "
3rd. Belvidere Mine, part Lots 9 and 10, R.
9 and 10, R. 8 Ascot 292 "
4th. Mining Rights in same vicinity on..... 250 "

All of the above properties lie within $1\frac{1}{2}$ miles of the Village of Lennoxville, at the junction of the Grand Trunk, Canadian Pacific and Passumpsic Railways, and have been developed to a considerable extent, and veins opened 6 to 20 feet in width, yielding 3 to 5 per cent. of copper, also silver, and 35 to 40 per cent. of sulphur. These mines are only $2\frac{1}{2}$ to 3 miles distant from the City of Sherbrooke, and evidently are of the same class of ores found at Copelton, only four miles distant, owned and worked by the Orford Copper and Sulphur Company, and by Messrs. G. H. Nichols & Co., of New York, which have proved so remunerative.

TOWNSHIP OF ORFORD.

- 5th. Carbuncle Hill Mine, Lots 2 and 3 R. 14, and
2, 3, 4 R. 15, 718 acres. Same class of ore as is found
in the Ascot properties above described, but yielding a
higher percentage of copper.

TOWNSHIP OF CLEVELAND.

- 6th. St. Francis Mine, $\frac{1}{4}$ Lot 25 R. 12, 50 acres, with
dwelling houses, smith's shop, ore sheds and office, large
winding and pumping steam engine, with boiler, winding
and pumping gear, and about forty fathoms Cornish lift-
ing pumps complete, railway tracks, ladders, etc., situated
three miles from Grand Trunk Railway. A consider-
able amount of mining work has been done at this mine.
A well defined vein richly charged with vitreous purple
and yellow sulphurets of copper traverse the entire
length of the property, five feet in thickness, yielding 8
to 40 per cent. metallic copper.

TOWNSHIP OF GARTHBY.

- 7th. Fifty-six lots of land, 2,938 acres. This prop-
erty for the most part is unexplored, but copper is found
on the greater part of the property. On one of the lots
a vein about twenty feet in width has been found.
Samples of the ore have yielded as much as 22 per cent.
of copper, being also rich in sulphur. Other samples of
pyrites from the same property, free from copper, have
yielded as high as 48 per cent. of sulphur. The only
drawback to this property is in its distance from the
railway, it being about four miles from Garthby Station,
Quebec Central Railway. A new line is chartered,
however, which, when built, will run directly through
the property.

TOWNSHIP OF ACTON.

- 8th. The Acton Mine, 100 acres, with engine, boiler,
pumps and appliances. Within three years after this
mine was first opened it produced nearly \$500,000
worth of copper. It is situated about half a mile distant
from the stations of the Grand Trunk and South Eastern
Railways.

- 9th. Brome Mine, part Lots 2 and 3 R. 4, 50 acres.
10th. Bolton Mine, two miles from Eastman Station,
Waterloo & Magog Railway, 400 acres.

The above properties formerly belonged to the Can-
adian Copper and Sulphur Company, and were acquired
by the present owner at sheriff's sale, giving an indis-
putable title thereto.

The whole or any portion of the property will be
sold at reasonable prices.

For further information apply to

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PROPERTY WELL DEVELOPED AND NOW IN
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WANTED. — Deposits of Magnetic Iron Ore, Red Hematite,
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stone, Marble, Gypsum, Baryta. Samples can be sent by Sample
Post for 1 cent for 4 oz. or up to 24 oz. in weight.

Information regarding mines cheerfully given. Correspondence
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300 ACRES,

One Mile from Quebec Central Railway.

Free from Reserves or Royalties.

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Improved method of setting for new and existing boilers.

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Department of Inland Revenue.

An Act Respecting Agricultural Fertilizers.

The public is hereby notified that the provisions of the Act respecting AGRICULTURAL FERTILIZERS came into force on the 1st of January, 1886 and that all Fertilizers sold thereafter require to be sold subject to the conditions and restrictions therein contained—the main features of which are as follows:

The expression "fertilizer" means and includes all fertilizers which are sold at more than TEN DOLLARS per ton, and which contains ammonia, or its equivalent of nitrogen, or phosphoric acid.

Every manufacturer or importer of fertilizers for sale, shall, in the course of the month of January in each year, and before offering the same fertilizer for sale, transmit to the Minister of Inland Revenue, carriage paid, a sealed glass jar, containing at least two pounds of the fertilizer manufactured or imported by him, with the certificate of analysis of the same, together with an affidavit setting forth that each jar contains a fair average sample of the fertilizer manufactured or imported by him; and such sample shall be preserved by the Minister of Inland Revenue for the purpose of comparison with any sample of fertilizer which is obtained in the course of the twelve months then next ensuing from such manufacturer or importer, or collected under the provisions of the Adulteration Act, or is transmitted to the chief analyst for analysis.

If the fertilizer is put up in packages, every such package intended for sale or distribution within Canada shall have the manufacturer's certificate of analysis placed upon or securely attached to each package by the manufacturer; if the fertilizer is in bags, it shall be distinctly stamped or printed upon each bag; if it is in barrels, it shall be either branded, stamped or printed upon the head of each barrel or distinctly printed upon good paper and securely pasted upon the

head of each barrel, or upon a tag securely attached to the head of each barrel; if it is in bulk, the manufacturer's certificate shall be produced and a copy given to each purchaser.

No fertilizer shall be sold or offered or exposed for sale unless a certificate of analysis and sample of the same shall have been transmitted to the Minister of Inland Revenue and the provisions of the foregoing sub-section have been complied with.

Every person who sells or offers or exposes for sale any fertilizer, in respect of which the provisions of this Act have not been complied with—or who permits a certificate of analysis to be attached to any package, bag or barrel of such fertilizer, or to be produced to the inspectors to accompany the bill of inspection of such inspector, stating that the fertilizer contains a larger percentage of the constituents mentioned in sub-section No. 11 of the Act than is contained therein—or who sells, offers or exposes for sale any fertilizer purporting to have been inspected, and which does not contain the percentage of constituents mentioned in the next preceding section—or who sells or offers or exposes for sale any fertilizer which does not contain the percentage of constituents mentioned in the manufacturer's certificate accompanying the same, shall be liable in each case to a penalty not exceeding fifty dollars for the first offence, and for each subsequent offence to a penalty not exceeding one hundred dollars. Provided always that deficiency of one per centum of the ammonia, or its equivalent of nitrogen, or of the phosphoric acid, claimed to be contained, shall not be considered as evidence of fraudulent intent.

The Act passed in the forty-seventh year of Her Majesty's reign, chapter thirty-seven and entitled, "An Act to prevent fraud in the manufacture and sale of agricultural fertilizers," is by this Act repealed, except in regard to any offence committed against it or any prosecution or other act commenced and not concluded or completed, and any payment of money due in respect of any provision thereof.

A copy of the Act may be obtained upon application to the Department of Inland Revenue, as well as a copy of a Bulletin which it is proposed to issue in April, 1888, concerning the fertilizers

E. MIALL,

15th Dec., 1887.

Commissioner.

Canada Atlantic Railway

THE
SHORT FAST PASSENGER ROUTE
BETWEEN

OTTAWA & MONTREAL
and all points East and South.

The only road in Canada running trains lighted with Electricity and heated by steam from the engine.

Luxurious Buffet Pullman Palace Cars on all trains between OTTAWA and MONTREAL.

Only line running through Sleeping Cars between

Ottawa, Boston, New York and all
New England and New York
points.

Baggage checked to all points and passed by Customs in transit.

During season of navigation close connections are made with Richelieu and Ontario Navigation Co.'s Steamers at Coteau Landing, shooting the St. Lawrence Rapids.

For tickets, time tables and information apply to nearest agent, or to

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PERCY R. TODD,
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E. J. CHAMBERLIN,
General Manager,
General Offices, Ottawa.

Centennial Exposition

—OF THE—

Ohio Valley and Central States,
CINCINNATI,
July 4th to Oct. 27th, 1888.

The Province of Ontario will be represented at this great Exposition with an exhibit of its Minerals and Mining Products, embracing the

Precious Metals, Economic Minerals, Building and Monumental Stones, etc., etc., etc.

All expenses of freight and exhibition will be borne by the Government, and as the time for making a suitable collection of articles is short it is hoped that persons interested in the display of the Province will co-operate in making it as large and full as possible.

Owners or managers of mines, quarries and reduction or manufacturing works are invited to communicate with the undersigned at Toronto, by whom full instructions respecting the exhibits will be given.

Articles intended for the Exposition should reach Toronto not later than the 20th of June, when they will be examined and classified for shipment to Cincinnati.

A. BLUE,

Commissioner for Ontario.

Department of Agriculture,
Toronto, 8th May, 1888.



INDIAN LANDS

LANDS IN THE UNDERMENTIONED localities are offered for sale to actual settlers through the following Indian Agents: On the Great Manitoulin Island, Lake Huron, Ontario; Mr. J. G. Phipps, of Manitowaning, is the Agent for the sale of lands in the following Townships on this Island: Assinack, Bidwell, Howland, Shequandah, Billings, Campbell, Carnarvon, Allan, Tehkumma and Sandfield, and in the Townships of Shequandah, Manitowaning and Shaftsbury (commonly called Little Current). Mr. B. W. Ross of Cockburn Island, is the Agent for the sale of lands on that Island and in the Townships of Gordon, Mills, Burpee and Barrie Island, and in the Township of Gore Bay as well as for those in the Townships of Robinson and Dawson, on Manitoulin Island. Leading roads have been constructed throughout the Great Manitoulin Island.

On the Saugeen Peninsula, Ontario, the land in the Townships Amabel, Albemarle, Keppel, Eastnor, Lindsay and St. Edmunds; as well as several Townships in the Peninsula, are offered for sale through Mr. William Simpson, Indian Lands Agent at Wiarton, County of Bruce, Ontario.

On the Garden River Reserve, Ontario, Mr. William Van Abbott, of Sault Ste. Marie, is the Agent for the sale of lands within this tract, and which are situated in the Townships of Macdonald, Laird and Meredith; also for lands within the tract commonly known as the Batchewar Bay Indian Reserve, and comprised in the Townships of Aweres, Fenwick, Kars, Pennefather, Dennis, Herrick, Fisher, Tilley, VanKoughnet, Tupper and Archibald. There is a leading road through these lands which affords ready communication with other parts of the country to intending settlers.

The condition of sale in respect to the lands within the Townships above described can be ascertained on application to the respective Agents.

(Signed) L. VANKOUGHNET

Deputy Supt. General of
Indian Affairs.

Department of Indian Affairs,
Ottawa, February, 1887.

CENTRAL CANADA Exhibition Association.

Annual Fair,

Under the Distinguished Patronage of His
Excellency Lord Stanley of Preston.

OTTAWA
September 24th to 29th,
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" Sheeting. " Mill-Board.
" Felt, etc., etc. " Cloth for Locomotive Boilers and Pipes, Wiping Waste (a specialty).
Engineering Supplies. Use my Boiler Covering and save 33½ per cent. on fuel. Buy my Fire-Proof Asbestos Boxes for Deeds, Silver-warc, Jewellery, etc., etc.

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Valuable Phosphate and other Mineral Lands,

In the Township of Buckingham, County of Ottawa.

Patent for Mineral Rights direct from the Crown.

TITLE INDISPUTABLE.

S½ of 25 in the 12th Range 100 acres
S½ of 25 in the 11th Range 100 acres
Three lots, 26, 27, 28, in one Block, in the
11th Range 600 acres
(adjoining Gore of Templeton.)

Also a Circular Saw Mill situated on lot 26, 11th Range, in good working order, and sufficient water power to drive two other mills of the same capacity.

About 30 thousand cords of firewood, chiefly hardwood, may be obtained on these said lots.

The lands are in close proximity to the celebrated Emerald, Little Rapids, and other richly productive mines in the great phosphate region. Recent prospecting has disclosed rich and extensive veins of the mineral.

The property is located one mile from the navigable waters of the Du Lievre River and nine miles from the Village of Buckingham, where the C. P. R., which two years ago built a branch line in order to secure the traffic of the industry, carries it to the port of Montreal.

Conditions and terms of sale may be known by applying to the proprietor,

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of Canada & U.S.

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MINING & CIVIL ENGINEERS
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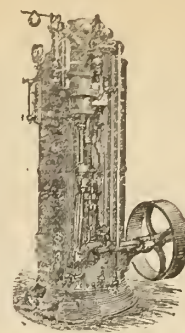
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Proposed Scheme for Keeping Mines

Clear of Inflammable Gas.—Mr. Gilbert

McPherson* proposes to effect this object (1)

by draining the coal of its gas before it is

worked out, while the bords are being driven ;

(2) by removing the pillars according to a plan

by which the goaf is kept clear of inflammable

gas. The first of these plans has never been

tried, but the second has been successfully

applied in one instance. In the first scheme it

is proposed to exhaust the gas from the coal,

before it is worked out, by artificial means (the

ordinary system of ventilation being still em-

ployed) so that it could give out no gas while

being taken down. This is to be effected by

laying down the shaft from the surface a small

column of pipes, and laying throughout the

mine a system of gas-draining tubes, a small

branch being carried into every working-place.

In the centre of each working-place a hole

would be drilled to the depth in each case

which experience would determine for each

particular seam. Into this a tamping block or

plug would be inserted and screwed up so as to

make it air-tight, and a connection made

between it and the draining-tubes by means of

a small India-rubber hose, distended with wire,

united to the tubes and the tamping plug by

union couplings of the simplest description.

On the surface an air-pump of suitable dimen-

sions would require to be erected and con-

connected with the column of pipes. When the

whole connections were made and the air-pump

started, the air contained in the holes drilled in

the coal would be exhausted and a partial

vacuum formed, when the gas in the surrounding

coal would be swept into the drain-pipes owing

to the atmospheric pressure forcing the air

through the pores of the coal, the air in its

passage becoming charged with inflammable

gas. In the second scheme it is proposed to

remove the bords after a system that the author

illustrates, by which, instead of beginning to

remove them in the usual method, an air-course

is first arranged round their district, and this

air-course is maintained till every bord is

removed. In the stoppings on the side of the

main air-course, which are of the usual descrip-

tion, three-inch wooden tubes are built in at

suitable intervals, and by means of these minia-

ture air-courses a quantity of air sufficient to

ventilate the goaf constantly circulates. This

method has been successfully tried in a mine

belonging to Messrs. Galloway & Co., at Hurl-

ford. There can be no doubt that by keeping the

goaf free from inflammable gas a very great

danger is removed.

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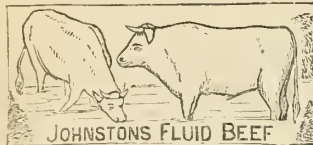
CRAIG & SONS—Constructors of Electric Light Apparatus for the Illumination of Cities, Towns, Villages, Public and Private Buildings, Mines, Workshops, etc. (by the Incandescent System). Also Electro-plating Apparatus, Material for Electric Light, etc.

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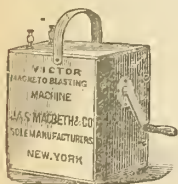
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Johnson's Fluid Beef

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Production of Cast Iron.—The *Revue Universelle des Mines* gives the following particulars of the world's production of cast iron, which may be of interest to our readers:—In 1880 the production of cast iron of the whole world was 838,000 tons, in 1885 it was 19,406,000 tons. During the period comprising between 1865 and 1886, the increase of production, calculated for the year of greatest production was: In the United States 456 per cent.; in Germany 237 per cent.; in Austria 152 per cent.; in England 76 per cent.; in France 64 per cent.; in Belgium 63 per cent.; and in Sweden 53 per cent. Great Britain produces more than the United States, which in return consumes more cast iron than steel. The consumption of the United States is at the present day one-fourth of the cast iron and one-third of the steel produced by the entire world. The diminution of cost of production effected in modern times by the improvements carried out in processes of manufacture is wonderful. Thus, a gross of steel pens, which are to-day sold at Birmingham for 4d., formerly cost £7 to produce. This industry is so important that a single manufactory at Sheffield now weekly sends to Birmingham 20 tons of rolled steel to be converted into pens.

An Engineering Feat.—An engineering work of singular magnitude and importance has just been inaugurated at Arques, near St. Omer, in France. The undertaking so successfully inaugurated is the work of Mr. Edwin Clark, C.E., of Great Marlow. The *Colliery Guardian* says: the work comprises a canal lift, superseding the series of ordinary locks, which at present so seriously impede the traffic on the large canal system communicating with Belgium. The Continental canals are on a much larger scale than our own, the canal boats usually carrying from 210 to 230 tons. The ground at this particular spot rising very rapidly, there are five or six locks in close contiguity, involving great loss of time and great cost in their management. By this invention of Mr. Clark's the canal boats are now lifted the whole height of nearly fifty feet at one operation, occupying only a few minutes of time, and no loss whatever of water. This singular machine consists practically of a gigantic hydraulic press, whose piston is 3 ft. 3 in. in diameter and 50 ft. in length, by means of which the boats themselves,

actually afloat in an enormous tank or reservoir, are bodily raised or lowered, water and all, to the required height. This reservoir is in reality an actual length of the canal itself, made of wrought iron plates, separated from the rest of the canal by iron gates, which are opened when it is raised into its proper position at the required height. There are two such presses, the one descending while the other is ascending, and they thus balance each other, and no steam engine or other mechanical power is required, although the weight lifted at each operation, including the water and the loaded barges, is very nearly a thousand tons. Sixteen hundred barges have already been lifted prior to this public inauguration, the task being performed by a single man, whose only work is the opening and shutting of a small valve, and the operation only occupies a few minutes. A smaller lift on this principle was erected by Mr. Clark some years since in Cheshire, and was then patented, but he has just completed a still larger lift in Belgium, which will be opened during the present month. The same system is now being adopted in Canada for transporting sea-going vessels across the isthmus which intervenes between the Bay of Fundy and the Gulf of St. Lawrence.

Grindstones.—A correspondent of an eastern paper gives a description of a visit to the Bay of Fundy and along the shores, where the grindstone quarries are located. The superintendent of the quarry says when the tide is out his men go down at the rocky shore and work out near the water. At low tide the men on the shore drill some holes in the ledge, put in powder, and blast out great pieces of rock. When the tide rises again they float out big logs and empty barrels over where the loosened rocks are. When the water goes down again they fasten a big rock to the raft with heavy chains so when the tide again rises it lifts up the raft and the rock with it. Then they tow as near the shore as they can. If it is the right kind and size for a millstone, sometimes it is allowed to lie there until the workmen, with stone chisel and hammer, work it into proper shape. At other times, by means of a derrick, it is drawn out on the wharf. Then it is rolled on a track and hauled to the factory.

In Reply to Dr. Selwyn.

ST. IGNACE, Mich., Aug. 16th, 1888.

SIR,—I noticed in the last copy of the REVIEW a letter from Dr. Selwyn repudiating the idea that Canadians are ignorant of the value of their mineral resources. I regret to say that my experience proves the existence of that state of ignorance. I failed in getting a blast furnace company started in Toronto chiefly on account of the dense ignorance of everything connected with the Canadian iron deposits shown by almost all the business men on whom I called in connection with the above project. Numbers asked if I would not be obliged to bring ore from the States for the furnace. One leading business man refused to listen to anything on the subject because "there are no iron ores in Canada." Out of one hundred and thirty leading men on whom I called, only seven showed an intelligent knowledge of the Canadian ores. They all knew more or less about Sudbury; but the large majority were surprised to learn that there were plenty of iron deposits within 200 miles of Toronto. The work of the Geological Survey is unnoticed by the greater portion of the public. Yours, etc.,

SAMUEL D. MILLS.

The Canadian Mining Review

CONDUCTED BY - - - - - B. T. A. BELL.

OFFICES:

UNION CHAMBERS, 14 Metcalfe St.
OTTAWA.

Vol. VI. AUGUST, 1888. No. 8.

Electricity as a Mining Power.

One of the chief factors in the near future of mining operations, is destined to be the electric transmission of power, the adoption of which will be found in the long run to be both profitable and economical. In localities where fuel is scarce and transport difficult, steam power is unprofitable, and as regards water power, many obstacles of locality and position interfere to prevent its use. But the method recently discovered of transmission of power to a distance at an economical rate will practically take the place of both steam and water. The Sprague Electric Motor system guarantees to transmit any desired horse power five miles or more, and to use the language of the prospectus before us, "is easily handled, can be applied at any angle, requires little attention, does away with the smoke and noise of the steam plant, vertical shafting, piping, &c., necessary in mining, and so saves the great loss of power incidental to the use of the same." The use of this motor at Big Bend on the Feather River, Butte Co., California, instances its power and usefulness. An electric circuit of 18 miles is established there, at 11 desirable points along which circuit, feeders are run out to Sprague motors, placed at the points on the river bed where power was required for pumping, hoisting, &c. These being perfectly flexible can be easily extended either way for a mile from the point of intersection with the main conductor, and the requirements are obtained by the expenditure of a small amount of money compared with the value of the end obtained. In Richmond, Va., the Union Street Railway Co. use this electric motive power for at least 20 miles successfully under the most difficult conditions, and for a protracted and exacting service. It is now no longer a matter of doubt, but is proved by actual operations, that by its use rich but hitherto unproductive mining property may be profitably developed. Careful estimates have been made by the Sprague Co. which show a good margin of profit in the delivery of water power transmitted from one to twenty miles. There is a location in Michigan now worked by compressed air, where the proportion of power utilized only amounts, after the loss in transmission, to 35 per cent., whilst the Sprague motor system guarantees to deliver at the mine 70 per cent. Again, freezing in winter and the wear and tear attendant on compressed air machinery is done away with. Nearly the same data of cost and loss of transmission of pneumatic power apply to steam energy, whilst the loss of power in transmission by wire for one mile is shown by experience not to exceed 10 per cent., so that taking 100

at the dynamo, and allowing 10 per cent. loss there, 10 per cent. of 90 by transmission, and 10 per cent. by reconversion at the motor, 70 per cent. of the generated power is the net delivery for work. Taking its place with the other electrical appliances of the mine, such as lighting, &c., it will enable all mining operations to be carried on by transmitted energy of some at present wasted water power one to twenty miles distant. Aspen, in Colorado, gives practical evidence of this, where the motor is used for hoisting, and for driving a stamp mill. As a traction power its operation is evidenced in an electric tramway at the Sugar Refinery Works, East Boston, Mass., where loads averaging 10 tons per trip, each trip occupying five minutes are drawn, where ordinary horse power only drew a load of one and a half tons, averaging 15 minutes, and the dynamo lighting the premises runs the motor. For hoisting, pumping, stamping, hauling and ventilation of mines the Sprague motor will be invaluable, and for efficiency and economy this electric transmission of power seems to be the most valuable discovery of the day. The cost of an electric power plant, as compared with any system of air compression is not over 40 per cent. (and nearly the same figure applies compared with the cost of transmitted steam energy) of the present cost of working under ordinary methods. The offices of the Sprague Electric Motor Company are 16 and 18 Broad Street, New York.

Chapman's Assay Notes.

A pressure of matter on our columns last month crowded out a notice of the second edition of the above manual by Professor Chapman of Toronto. This work, which the author in its title page styles "Practical instructions for the determination by furnace assay of gold and silver in rocks and ores," is almost too much condensed, as the information it conveys is very valuable, and would bear more detailed explanation, especially for the younger students in that branch of mineralogy. The author has evidently noticed this himself when he states in the preface that "the work being intended for use in the laboratory" the student will see for himself many of the details which are omitted. It must be borne in mind that the assays explained are not of metals, but of rocks and mineral ores for the detection and determination of any gold or silver that may be present in them. Directions for selecting samples for assay are given, which if properly followed, would save much disappointment, for it not unfrequently happens that the best samples are picked out for assay, and consequently a result is obtained quite misleading and not all in accordance with the general yield of the rock or vein from which they have been forwarded. This direction especially is well worthy of notice. The various processes of assays are described, and as a handbook to accompany actual manipulation, the work in question has much to recommend it. Professor

Chapman's researches are so well known, that his name alone gives an authority to any emanation from his pen, and we recommend the possession of this manual to all concerned in this interesting branch of mineralogical study. It contains a few additional paragraphs beyond what is to be found in the first edition of the handbook, and the original tables have been revised. It is published by the Copp Clark Co. Toronto, and is neatly got up in cloth.

Ontario Mineral Exhibits at Cincinnati

We have before us a descriptive Catalogue of the Mineral Exhibit of the Province of Ontario, at Cincinnati, collected and placed under the direction of Archibald Blue, Deputy Minister of Agriculture of that Province, such exhibit having formed a place at the Centennial Exposition of the Ohio Valley and Central States, which opened on the 4th July last, and which will remain on exhibition to October 27th next. In the introduction, the invitation for the Government of Ontario to take part in this Exposition is alluded to as showing the kindly sentiment which prompted it, "especially in view of the fact that, once parts of one territory, Ontario and Ohio are neighboring commonwealths of almost equal age, largely similar in climate, products and institutions, peopled by the same great race, and having a common record of pioneer annals." A synoptical sketch of the mineral resources of the province, with its geological features prefaces the catalogue, and statistics of the mining industry and its products, together with exports and imports of the products of the mine, give a most comprehensive idea in the smallest possible space of what Ontario is doing. Mr. Blue remarks in speaking of the extent and richness of many of the mineral deposits of Ontario that "their nearness to the great manufacturing cities of the United States is an assurance of their future value." The appendix to the catalogue contains directions to the public for the transaction of business with the Crown Lands Department, and for the purchase of land under the Mining Act. The text of the latter is given also in full, and a list of the economic minerals of Ontario with the localities in which they exist, arranged in scientific order, both being especially useful for reference. The catalogue by means of these additions beyond a bare list of exhibits has thus been made a concise mineralogical handbook of the natural resources of the province, and besides its usefulness as a guide book to visitors to the Exposition, its contents will tend to draw attention to the great resources we naturally possess, and is really by that means a very useful adjunct to the propaganda in circulation for immigration purposes. The concise yet comprehensive description given by Mr. Blue is well worthy of remark, and is a new departure from the old style of catalogue, simply explanatory of the objects exhibited, which may with good effect be used in similar works hereafter published by governments, corporations, or individuals.

LETTERS TO THE EDITOR.

We invite Correspondence upon matters consistent with the character of the REVIEW.
Be as brief as possible. The writers name in all cases required as a proof of good faith.

One dozen copies of the issue containing his communication will be mailed free to any correspondent on request.

We do not hold ourselves in any way responsible for the opinions expressed in this section of the REVIEW.

Mr. Shirley's New Process of Treating Crude Phosphate as a Fertilizer.

NEW BEDFORD, Mass., Aug. 18th, 1888.

The Editor

THE CANADIAN MINING REVIEW:

SIR,—Some time since I promised to furnish you with an account of the results obtained from using the crude ground phosphate after being treated by the process of which I gave you some information in the early part of the year. Press of business has prevented my being able to give this subject attention until now, but the delay has not proved any detriment to the progress of the trials, and only confirms the results as being the more assured than if it had been reported on at an earlier date.

The tests have been only on a limited scale, but the results have been so marked that it has put the value of the material as a fertilizer beyond all question. On tender house plants it must be used most sparingly, otherwise it forces the growth so as to make the plant overgrown and weak; the trial on some celery beds has proved a marked success, the heads being fully 20 per cent. larger without destroying the crisp tenderness which is so desirable in this plant. Several nurserymen are taking the matter in hand, and are following up a series of tests, so that by the fall I hope to be able to give full and specific directions for all purposes to assure its proper use and to obtain the best results, as with an article of this kind the abuse of it might probably do it more harm in its introduction than good. From experience thus gained we look to the reserve power of the so called insoluble portion of the material to be of lasting benefit to future crops, as by the process of disintegration which is constantly going on, especially during the winter months, the ground will be rendered richer and ensure beneficial results in the following season. It will, of course, take several seasons to make its merits known and convince the skeptical of its true value; but, with the qualities contained in this article, its continued use will remove all doubts and make it the accepted medium for fertilizing in the future. If once thoroughly introduced the demand will continue to increase.

Trusting the material will become as widely known as it deserves for the benefit of all engaged in the phosphate industry.

I am, yours truly,
FREDERICK S. SHIRLEY.

GEOLOGICAL SURVEY CAMP,
DU LIEVRE RIVER,
Ottawa County, 19th Aug., 1888.

The Editor

THE CANADIAN MINING REVIEW:

SIR,—In your last issue appears a statement regarding the work I am now prosecuting in this district under instructions from Dr. Selwyn, the Director of our Survey, which gives a very erroneous idea of its nature and objects.

In view of the new material brought to light

by the developments made during the last few years on the phosphate deposits, and the greater facilities for study now afforded by the opening up of the industry of the district, it has been deemed to supplement the work already done in this direction by the Survey by undertaking a further detailed investigation into the nature of these deposits and of the rocks associated with them.

The topographical measurements now being made by my assistant, Mr. Jas. White, are undertaken simply with a view to the collection of data sufficiently detailed and accurate for the construction of a map on the large scale necessary for the working up and representation of the geological details brought to light by the investigation commenced last month.

I am, Sir, yours, &c.,
ELFRIC DREW INGALL,
Mining Geologist
to the Geological Survey of Canada.

Soluble and Insoluble Phosphates.

A. H. Ward, Boston.

Another comparative experiment with phosphate made by the Pennsylvania State College Experiment Station confirms experiments made by the New Jersey Experiment Station and many others, and shows that the less soluble and cheaper forms of phosphoric acid are likely to prove equal or superior to the more costly soluble acid phosphates.

The results of these various experiments should be well known by the various experiment stations, and, if they are known, what justifies them in making so great a difference in value as 400 per cent. between soluble and insoluble phosphates? It all comes out of the farmers.

A bulletin of the Pennsylvania State College Experiment Station gives the results of experiments made with phosphates in a four-crop rotation in the years 1883-7, the first year's crops being grown without manure, to determine the relative fertility of the several plots. The plots were twelve in number, each of them one-twentieth of an acre in extent, and the soil is what is usually called limestone clay. Oats were grown in 1883, and the product showed considerable variation in the fertility of the several plots. Taking 100 as the average of all, they ranged from 91.62 to 114.52, eight being under the average and four over it. The rotation was in the order of wheat, grass, corn and oats, and the fertilizers were applied to wheat and corn only—the grass and oats getting the residual effects. Two plots were unmanured throughout the experiment, and from the results of these the values of the fertilizers were computed. The experiments were made to study the effects of different forms of phosphoric acid, and to guard against failure from a lack of any of the elements of plant food, each of the plots, except the two unmanured ones, as treated to 200 pounds of muriate of potash and 240 pounds of sulphate of ammonia per acre. They were thus supplied with nitrogen, potash, sulphuric acid and chlorine, while the limestone soil contained a vast excess of lime, magnesia and iron above what the crops could possibly use. Two of the plots received no other manuring, and the remaining eight were treated in pairs as follows:

1. 200 pounds dissolved boneblack, the phosphoric acid largely soluble.

2. 200 pounds dissolved boneblack, previously treated with lime; phosphoric acid largely reverted.

3. 150 pounds fine ground bone.

4. 150 pounds ground South Carolina phosphate; phosphoric acid largely insoluble.

These fertilizers were all standard articles of trade. Now for the results. Of the 56 single cases recorded, 36 show unmistakable gain resulting from the use of phosphoric acid, six show a probable gain, eight a doubtful gain, and the remaining six an apparent loss. But the results give no satisfactory proof that one form of phosphoric acid is superior to another. It would appear, however, that a limestone soil is not the most suitable for a phosphate fertilizer, owing to the circumstance that it precipitates the superphosphate so quickly as to prevent due distribution to the roots of plants. A comparison of the results obtained in the experiment with the results of other experiments appears to justify the conclusion that "upon lime soils, upon very light sandy soils, and upon pure peat soils, the less soluble and cheaper forms of phosphoric acid are likely to prove equal or superior to the more costly soluble acid of the superphosphates. But the director of the Pennsylvania station wisely enjoins caution in departure from established practices. A few simple and inexpensive trials of reverted or insoluble phosphates on a small scale would readily show one contemplating their use whether they were likely to prove profitable under these circumstances or not. No general rule can apply to every soil."

Mining in Newfoundland.

The first copper mine was opened in Newfoundland in the year 1864. So rapid was the development of copper mining that in 1879 the total ores of copper and nickle exported amounted to \$4,629,889, and Newfoundland reached the position of sixth among the copper producing countries of the globe. The first copper mine opened was at Tilt Cove, situated on the north side of Notre Dame Bay, six miles south-west of Cape Joan, and two hundred and twenty-five miles north-west from the City of St. John's. Here the coast is very high and precipitous, and Tilt Cove is formed by a narrow opening which widens into a circular space in which there is a small fresh water lake. This space is surrounded by steep hills and rocks, and with the exception of the narrow opening to seaward, does not exceed three-eighths of a mile in diameter. In this space and on the west side of the neck of land separating the sea from the small lake, mining operations were commenced, the workmen's houses, offices and stores being around the small lake. At the close of 1879 this mine had yielded 50,000 tons of copper ore, valued at \$1,572,154, and nickle ore worth \$32,740. It was eclipsed in 1875 by Bett's Cove mine, from which in four or five years no less than 125,556 tons of ore were taken, valued at \$2,982,836.

The price of copper began to decline and went down lower and lower, there being a glut in the market. Tilt Cove mine became less remunerative, and mining was carried on in a languid way for a time and finally was discontinued. The general impression was that the best of the workings had been exhausted and that little ore remained. In all, it had yielded 70,000 tons of ore. In 1878, a new and wonderful deposit of copper ore was discovered at Little Bay, which left all previous discoveries in the shade. It presented great facilities for working, and here mining was and still is carried on upon an extensive scale. Tilt Cove was almost forgotten and was believed to be "played out." It was placed on the market

by its proprietors who were still impressed with its value, and believed that far more ore still remained than had been extracted. The price of copper, however, was low and for a time no purchaser appeared. At length the French copper syndicate took the field, and the price of ore bounded upwards. The mine was speedily purchased for £80,000 sterling, certain parties having an agreement which gave them the option of buying at that price. The speculation was a lucky one for them. A few weeks afterwards they sold it to the representatives of the syndicate for £160,000 stg., or \$768,000. Workings have recommenced vigorously, and this summer a large number of miners are at work. The explorations of experts have proven that the main deposits of the ore have hardly been touched, and that a vast quantity of ore awaits future operations. Once more we have a confirmation of the statements made during many years past, that this island will one day be a great mining centre, its undeveloped mineral resources being very great.

This mining property at Tilt Cove is an instance in point. At the beginning of this year, and in view of purchasing, a mining engineer of experience was sent out from London to report on it. In his report he says that in what is known as the East mine there is a mass of copper and iron pyrites of extraordinary dimensions.

"This has been cut by an adit level, driven from the north slope of the hill in a southeast direction, through massive chloritic and micaceous schists and slates 430 feet when the north wall of the mass was found, bearing north 45 degrees east (nearly) and having a slight underlay to the northwest. The mass of pyrites has been cut at a right angle to the north wall 136 feet without finding the south wall. It has been opened from east to west 62 feet over all, and there is no appearance of an end of it in any direction. The whole mass is quite homogeneous; there is no mixture of any rock matter in any part of it. There is at present room for men enough to break 2,500 tons a month, and which amount may be increased as the vein is farther opened out. The vein may be driven till the south wall is found; and the height from the adit to the surface, in the centre of the mass, is about 100 feet, a large portion of which would be available as soon as the shaft can be got through it. By the present system of working I estimate the cost of putting the ore on board ship at \$2.50 per ton. This includes all and every expense."

Even this is not all. The same property includes another called the "Long Pond Mine," two miles west of Tilt cove, where there is an extensive vein which has only been slightly explored. A shaft has been sunk on it thirteen fathoms, and seventy tons of ore carrying 11 per cent. of copper has been shipped from the stuff broken in sinking. Another mining engineer of high standing said in his report: "It would be difficult to find a mining property, in any other part of the world, with such an enormous amount of mineral in sight; and I see no signs of exhaustion notwithstanding several hundred thousand pounds worth of ore have already been extracted."

The mine first worked, the profits of which during the whole time of working amounted to £60,000, is now full of water, but it is not improbable that it will be pumped out and the workings resumed. But there are lying around this old mine, immense dump piles which have been thrown away. An engineer has estimated these piles at 200,000 tons, out of which could be picked 50,000 tons which would give 5 per cent. of copper; and a further treatment would reduce it to 20,000 tons of 12½ per cent. copper one for shipment or smelting. He calculates that a clear profit of £12,500 sterling would be realized on the treatment of these dump piles, which had been thrown aside as useless rubbish.

When a single mine, and by no means the

largest, yields such returns as these, can it be doubted that in the future this island will be the scene of large mining operations? It is in connection with the serpentine series of rocks that these copper ores are found, and that series covers 5,097 square miles. Lead and silver ores have also been found in many localities, and gold has also been discovered, but as yet only in small quantities. The copper ores, however, are by far the most valuable and extensive. Professor Stewart, an American expert of eminence, said in his report, after visiting the mining region: "I have never seen finer copper ore in the course of my experience. The character of the rocks in which it occurred was such as to give an absolute assurance of perpetuity in the working. Judging by the laws which govern mineral deposits, the depth of the veins in many places is such as to render them practically inexhaustible. I have not seen a more promising field for copper anywhere."



Markets.

Prices in the United Kingdom and the continent remain about the same as quoted in our last issue.

Shipments.

Phosphate shipments from Montreal for month ending August 18th, 1888:—

Date.	Ship.	Destination.	Shippers.	Tons.
July 10	Circe.....	Glasgow...	Lomer, Rohr, & Co.	150
" 17	Colina.....	do	"	240
" 20	Escalona.....	Dundee...	"	220
" 24	Canopus.....	Liverpool...	Wilson & Green..	407
" 25	Jas. L. Hanray	Bristol....	Lomer, Rohr, & Co.	200
Aug. 1	Murciano.....	London....	Wilson & Green..	170
" 1	Bothail.....	do	Millar & Co.....	212
" 4	Cremora.....	Hamburg...	Wilson & Green..	127
" 4	do	do	Lomer, Rohr, & Co.	125
" 6	Lake Superior.	Liverpool..	"	285
" 13	Fremona.....	London....	"	220
" 13	Chateau.....	do	"	421
" 13	Leoville.....	do	Millar & Co.....	100
" 13	do	do	Wilson & Green..	216
" 13	Lake Nepigon	Liverpool..	Lomer, Rohr, & Co.	335
" 13	do	do	Millar & Co.....	130
" 17	Oxenholme....	do	"	80
" 17	do	do	Wilson & Green..	435
Total.....				4,134

RECAPITULATION.

SHIPPERS.	
Lomer, Rohr & Co.....	2,157
Wilson & Green.....	1,355
Millar & Co.....	622
DESTINATIONS.	
Liverpool.....	1,673
London.....	1,439
Glasgow.....	350
Hamburg.....	252
Dundee.....	220
Bristol.....	200

Du Lievre.

The navigation of the Lievre river at Little Rapids is causing no end of trouble and expense to the phosphate miners of the district. The contractors of the new lock and dam are very tardy in their operations, and up to the present have so bungled what little work they have done as to completely alter the channel of the river at this point. At present very lightly laden scows have great difficulty in getting over, and the shipments from the mines are consequently very much retarded. The tardiness of the contractors in the construction of these very desirable works is the theme of many bitter remarks at the mines.

During July about 1,300 tons of high grade and 400 tons of "seconds" were shipped from High Rock for the English market. The pits look well, and everything goes on much as usual at these mines. Shipments for August have been very much hindered by low water at the Rapids. A telephone from the main buildings to the landing, a distance of a mile and a half, has recently been constructed.

A little girl, the daughter of one of the miners, had a portion of her hand blown off a few days ago, at these mines, by the explosion of a cartridge.

The tramline and other improvements at the Canadian Phosphate Co.'s Mines are rapidly nearing completion. A goodly quantity of ore has been mined. The management have, we believe, struck good ground at a depth of 140 feet in their "big" pit. From 160 to 170 men are employed.

A very large quantity of "seconds" awaits shipment at the Dominion Co.'s wharves.

We are requested to state that there is no truth in the statement that the Phosphate of Lime Co. are negotiating for the purchase of the Emerald.

Perth District.

The Anglo-Canadian Phosphate Company continues to meet with success in mining on the contract system at the Otty Lake Mines in North Burgess, and the Bobb's Lake Mines in Bedford. At the latter place four men took out 52 tons in five weeks, and their success has brought in a number of contractors, all of whom so far have readily found good shows. A considerable proportion of the phosphate obtained consists of crystals. The company have had prospecting done on the lots at the west end of the Gore of Templeton, and a number of promising shows have been opened. These are being let out to contractors to work, and a good output is expected. It is proposed to call the property "The Lake Tassie Mines."



We shall be greatly obliged to mine owners and superintendents for such authentic reports of their operations as may concern shareholders and the public.

Nova Scotia.

At the Drummond colliery operations have been very seriously retarded by a "crush" (a difficulty frequently met with in extracting pillars). Every effort has been made to find work for the men thus thrown out of employment.

The Acadia Company have extended their main hoisting slope down to the new lift which was sunk some time ago. This makes the main slope at this colliery the longest in the province hoisted by one lift, the total length being over 3,000 feet.

At the Albion mines the work of sinking the English slope to the Cage Pit seam is still continued, although rapid progress cannot be recorded. The pumps at the Foord Pit are still out of order, and although the water in the pit has been reduced to within 40 feet of the bottom, months will probably elapse before the bottom is seen.

Since our last the diver working at the buckets of the Foord pit pump met with a curious accident which nearly cost him his life. While down in the pump shaft he missed his rubber wrist-bands, and was returning to a temporary stage which had been erected, to put them on, when nearing the top of the ladder he missed his footing, and fell back head-first into the water. In his endeavors to right himself he got fast under the air pump platform. The three men who were attending the diver, finding that they could not extricate him from his perilous position, decided that the only chance of saving his life was to hitch the rope of the winch engine to the life line around his body. The engine was started, and by a steady pull landed the diver safely on the pump platform. He escaped without injury, excepting a slight bruise in the back, caused by the force of the engine tightening the life line.

A discovery of coal is reported from Five Islands. Mr. Nickum, of St. Louis, Mo., one of four American capitalists owning large timber limits in the vicinity, has engaged Mr. Edward Wilkinson, an experienced miner, who holds a manager's certificate, to open up the new seam.

Recent newspaper despatches state that the Lawson coal mine near Meccan, Cumberland Co., has been sold to Montreal capitalists. We are in a position to state that the rumour has no foundation in fact.

In boring for water at Spring Hill mines, two large seams of coal were found in a southeasterly direction from the present, in a locality where the existence of coal had been unsuspected. This discovery will add greatly to the value of Spring Hill properties.

At Chignecto mines two seams have been recently struck at the outcrop—both of good size, neither of which had been previously discovered or worked, it is believed, on that area. They give promise of being good coal. In this connection speculation is again rife as to the probable existence of another field of coal south of any of the Joggins seams hitherto prospected.

Mr. Wadsworth has brought in from his Caribou mines, a fine brick of 214 ounces from 111½ tons.

We understand, says the *Critic*, that a wealthy English syndicate, introduced to this country by Mr. James C. Ashton, has purchased the Lochaber Gold Mine from Mr. John H. Anderson and others. The Lochaber district is a comparatively new one, situated between the Fifteen Mile Stream fields and the Salmon River Mine. No mine has hitherto been worked there. The prospecting shafts look very well, and show a good body of ore which should yield at least one ounce of gold to the ton. A stamp mill will be erected at the mine forthwith. Six cwt. of ore sent to England for treatment produced the extraordinary result of twenty-eight ounces of gold to the ton. Notwithstanding the fact that test assays are not always the best guide as to the value of a mine, we know enough of this one to predict such a satisfactory return that more English capital will be attracted to these long-neglected gold fields. Mr. C. H. Cox, of Liverpool, who represents the syndicate, is an artist of no ordinary ability, and his pencil, brush and camera have been kept busy during his visit of inspection. Some of his sketches will appear

in one of the English illustrated papers, and they will no doubt convey to the stay-at-homes some idea of our beautiful Nova Scotian scenery. If this second precious infant of Mr. Anderson's proves as healthy and flourishing as his first (the Oxford Mine, Lake Catcha), it will only be just recognition of his long and untiring services in striving to place the gold mining industry of the province upon a sound and firm basis.

Mr. D. Rattie, superintendent of the Dufferin Mine, Salmon River, is the first one to arrive with July gold. He brought in 279 ounces.

A bar weighing 141 ounces is the result of the first crushing at the Northup mill, Central Rawdon.

Work at the Greener-Ingraham iron seam, Cape Breton, is being actively pushed. Three shafts have already been sunk, one to a depth of 15 feet, which contained 14 feet of ore. They have also traced the lead to the shore. A wharf is about being erected for the shipment ore, and in about three weeks those in charge expect to be in a position to raise 100 tons per day. They have recently opened two other shafts quite a distance apart and have found the ore equally as good.

New Brunswick.

The coal fields of the Grand lake region of New Brunswick are said to be practically inexhaustible and should be explored. The rapid increase of railway mileage in this province makes it especially desirable that the facts respecting her coal be scientifically and thoroughly tested by boring.

Quebec.

The natural gas wells at St. Gregoire were visited recently by Dr. R. C. Selwyn, Director of the Geological Survey of Canada, says the *Montreal Star*. The doctor is quoted as saying that there is a strong flow of gas at the wells, and that the gas burns well and the supply is large. He thinks that a thorough examination of the gas supply should be made. The proprietors, it is said, are negotiating with American capitalists with a view to have them take hold of the well for the purpose of utilizing the gas. The gas was discovered in 1885 by Mr. Porier, M. P., of St. Gregoire, who organized a small company and sank a shaft on Mr. Trudel's property, which yielded a fair quantity of gas from a depth of 115 feet.

Very valuable deposits of porcelain clay are shortly to be worked by Mr. E. Duval, merchant, of St. Peter street, Quebec. A professional analysis has been made of some of the product taken from near the surface and good results are promised. The works will be opened back of St. Urbain, near Baie St. Paul. Samples shown promise exceedingly well.

Operations have been resumed at the Nailon Gold Mine, near Buckingham, seven or eight men having been set to work, with Mr. John Haley as foreman. A shaft is to be sunk to a depth of twenty feet, which, it is thought, will penetrate the richer portion of the workings. The syndicate are more than ever convinced that they have struck a good thing, judging so from the increased richness of the output. If the results of the next assay prove encouraging they will put on a large force of men and work the thing for all it is worth.

Ontario.

The oil well on the property of Mr. J. Lalonde, located about a mile north of the railway at Comber, near London, is steadily overflowing. The oil, which is of black color, and very thick, comes from a depth of 1,300 feet. Mr. Lalonde puts up about half a barrel per day.

The Hungerford Marble Company shipped during the month two cars of Bridgewater marble to Chicago.

At the cleaning up on Tuesday, the 10th instant, of a lot of seven tons of rock from the Richardson Gold Mine, the yield was found to be from \$40 to \$60 per ton, which is highly satisfactory. The prospect is so encouraging that additional capital will be invested and a crushing mill erected.

Sudbury District.

On Friday, 10th instant, the Ontario Mining Commission visited the Vermillion Mining Company's property at Whitefish, and while there made observations and took evidence in Denison. There were present Messrs. A. Blue, Dr. Bell, W. H. Merritt and Monaghan. On Monday, the 13th, they began operations in Sudbury, meeting here Mr. Coe, and being joined next day by Mr. Charlton. While here they visited the several mining locations under the Canada Copper Company, and took evidence of several of their officers, as well as that of prospectors and others engaged in this district. The evidence of Dr. C. D. Peters, General Manager, was complete and concise, as well as most interesting. Among prospectors several were examined, and the information was elicited that Mr. James Stobie was developing two properties, one of argentiferous galena, and one of a pyritous ore with galena carrying a good value in silver and gold. That Mr. Kettle had a good promise in argentiferous and auriferous galena. And that others had made discoveries of veins of copper, the nickel-bearing pyrrhotite, and gold quartz, as well as galena. They visited the Stobie, the Copper Cliff, and Eyre (now Evans) mines. In each of these locations development is progressing most favourably, and stock fast accumulating for the smelting works, which Dr. Peters hopes to have in running order by November.

The Vermillion Mining Company are now developing three shafts, one in copper and two in gold. At the copper shaft the surface material yields considerable gold, besides some metals apparently of the platinum group, which are also contained in the copper and nickel ore at the bottom. The management are sinking through this deposit which will be developed by drifting at a later date. No. 2 shaft is being enlarged, and a new shaft, No. 3, is being sunk on a very promising vein within a quarter of a mile of No. 2, to the south-east. The vein matter of this shaft yields about \$18 per ton in silver and gold. This company have adopted the praiseworthy policy of permitting prospecting on their property (about 2,000 acres) on payment of a royalty.

In Graham, Chicago parties have been sometime at work, and are now meeting with encouragement. This, we hope, will rapidly develop into a well paying gold quartz.

Many prospectors have returned now that the fly season is past, but there is still room for many more, and we hope to see things assume a more business-like aspect before long.

A statement in some of the daily papers to the effect that the new smelting works to be erected by the Canada Copper Co. will cost \$1,500,000 is contradicted by Mr. R. Hedley in the *World*. He writes:

"In conversation to-day Dr. Peters said he should be very sorry if it cost one-thirtieth of that figure. An instance of the cost of the erection may be cited to show how absurd such statements are. A year ago the Calumet and Hecla finished their new smelting and refining plant at Lake Linden, Mich. They have a complete smelting and refining plant of the most substantial kind. Their buildings are mainly of stone, and no expense was spared to make them perfect in utility and appearance. They include fine docks with every facility for loading and unloading. The cost of this beautiful plant was \$500,000."

Port Arthur District.

There has been an unusually large influx of mining men into this region during the past month, the stages to the mines being crowded daily.

The Mining Commission appointed by the Ontario Government are expected to reach Port Arthur on the 19th instant, when a large amount of valuable mining information will be obtained.

Some of the more promising silver finds are quietly changing hands. There have also been a few sales of cheap properties.

There is a large amount of iron lands on Hunters Island being located, and an odd location for gold.

The continued favourable development of the Beaver, Badger, Silver Mountain, Silver Fox, Caribou and Crown Point Silver Mines assures the success of silver mining as a permanent industry.

There is considerable stir in the lead region east of Port Arthur, around Black Bay. Several of the properties are being developed by capitalists who have them bonded with a view to purchase at large figures.

Numerous prospects are being worked on a small scale for silver by private parties of small means, some of which will eventually attract the necessary capital to make them worthy of a name.

The Government are gradually settling the various disputed claims which were up before their Commissioner, and the successful applicants are consequently jubilant.

Manitoba and North-West Territories.

Letters patent of incorporation have been applied for by the "Sebaskong Lumber and Mining Company," with a capital of \$22,000 and chief place of business at Rat Portage.

British Columbia.

The shipments of coal for the month of July from the twin ports of Nanaimo and Departure Bay, are the largest yet attained in the history of coal mining in the Nanaimo District. The total shipment amounted to 40,158 tons, loaded into 26 vessels. This amount does not include the Provincial trade, such as supplies to the local steamers, and the home consumption of the Province. The value of the exports of coal for the month of July is placed at \$140,553 for custom purposes. This increase in the shipment of coal has caused a corresponding increase in the number of residences erected in Nanaimo and the Wellington settlements.

The news that has arrived by way of Victoria, B.C., of the explorations of Mr. Ogilvie, who, while surveying the far North-west of Canada on behalf of the Dominion Government, wintered on the Yukon, is very gratifying. He explored the Yukon for 700 miles and found it very rich in gold and silver, some of the miners making large sums. This result is only a fresh instance of the fact that the more Canadian territory is explored the richer is it found to be. This is the case even in localities which have been supposed to be most unpromising. The British Columbian "sea of mountains," of which we once heard so much, turns out to be exceptionally rich in minerals, clothed with luxuriant forests, with which fertile agricultural lands are interspersed, while its coasts teem with fish of the most valuable kinds.

* The Coalfields of Cape Breton.

By E. Gilpin, Jr., F.G.S., F.R.S.C., Inspector of Mines.

The popular idea is that a coal mine is a hole in the ground, and a coal field a section of country uninteresting from heaps of coal refuse, and the unpolished manners of its inhabitants.

A closer survey, however, shows that the "hole in the ground" exercise the highest engineering and technical skill of those who conduct the operations connected with sinking them, and extracting the coal with the minimum of cost. The manners of the miners, if marked with a certain reserve toward strangers, are those of men whose occupation differ from the callings of ordinary humanity; and among themselves they are friendly and charitable and ever ready to dare the dangers of the mine if a comrade calls for help. When the figures of the statistician show that the power and wealth of a nation is directly measured by the number of tons of coal it produces and consumes, the subject acquires a general and vivid interest. Coal fields seem to be a special gift of Providence to nations, and curiously enough the English-speaking races have the lion's share of coal fields, and have well availed themselves of their privileges.

The extraction and exportation only of coal however is not a permanent source of wealth. The treasures of the mine resemble more those of the forest, than the treasures of the field and of the sea. Every ton of coal when it leaves the country represents, in most cases it is presumed, a certain amount of profit, but its removal increases the cost of the extraction of the next ton, and like a tree of the forest it cannot be replaced. It must be used locally to smelt the ore, forge the metal, ply the loom, or to build the multifarious machinery demanded to-day, before its true value is seen. One man can dig a ton of coal, but two must toil before it has yielded up its many items of power, or heat, or light. Take the mother country, did she export all her coal, and close the myriad factories supported by it, her position would be vastly different.

The few introductory remarks I am permitted to make should however be directed rather to the geological than the economic side of my paper.

Could the student carry himself backward, beyond the time of Confederation, to the period of the formation of the Cape Breton coal beds, and take his stand on the granitic hills of Cape Dauphin, at the entrance of the Bras d'Or lake, his eyes would wander over a view widely different from that of the present day. Instead of the rolling hills covered with spruce undergrowth, and occasional ridges of hardwood which now stretch eastwardly from Sydney to the shores of

the ever-encroaching Atlantic, he would see, mile upon mile, a dead monotonous level, with here and there dull sluggish reaches and swamps of dark peaty waters, while overhead the rays of a sun warmer than that now allotted to us, could scarce dissipate the clouds of vapor it kept drawing from the heated water and steaming soil.

On a nearer approach, this uninteresting country, which we would compare to some of the tidal marshes of the Bay of Fundy, is found to be covered with the densest of vegetation. No modern forest, tropical or temperate, reproduces the curious scene. A closer study, however, would detect some trees bearing a fanciful resemblance to plants now growing in the earth. There was one tree specially beautiful, its towering stem sometimes nearly one hundred feet in height, was fluted like a temple column, and crowned by magnificent fern-like fronds, a mysteriously-developed tree fern. Its roots descending into the marshy ground radiated, divided and sub-divided until they could suck nourishment rapidly for the great tree above with its quick growth and frequent branch-making.

There is also another tree with peculiarities now characteristic of the "club mosses," but its branches were flung wide in the air, and it appeared to the casual observer like a mighty pine.

Yet another curious plant recalls our "mare's tail," but its fluted bamboo-like stems were often forty feet high.

In those pre-historic forests of twenty millions of years ago, there was scarce a temptation for the little children to wander as Babes in the Woods, for nature, rioting in luxuriant growth, did not deign to captivate by the exhibition of the fleeting colors and fragrances which poets have sung and nations admired. In vain would search have been made for any plant now called national: the rose, the thistle, and even the humble emblem of our Province, all were wanting, and perchance only the mosses and fungi relieved the sombre colors of that "Dismal Swamp."

In vain would the hunter, so far as the records of the rocks inform us, have searched for his prey, in the air, or by land, or by sea. Locusts, beetles, scorpions, nondescript frogs or newts, all labored in their task of subduing, consuming and consolidating the great masses of vegetation. However, it must be said that these remarks are based on negative evidence only, the plants and insects from which our imagination has reconstructed so curious a page in the history of mother earth, are few in number, and owe their preservation as fossils to peculiar circumstances. There may have been many other organized helpers in the great scheme on the hills and highlands surrounding the marshes, and imagination may depicture the graces and beauties and the melodious sounds of an untrodden land.

Such were some of the curious forms that were crowded in the battle of life which left victors and vanquished preserved for our sole benefit. The plants grew and fell, and were buried, the water of the swamps allowing but a tardy decomposition, until a deep peaty mass accumulated. The sub-soil, a clay or loam, was filled with rootlets until perhaps no further mineral nourishment of silica or of potash, etc., was available. Long years this swamp, devoid of living vegetation, lay gradually undergoing changes consisting chiefly of elimination of water from the vegetable matter, until some oscillation of level, perchance a change in the current of some by-gone river unnamed and

unsung deposited on its partly hardened surface a layer of silt or mud. This went on until hundreds of feet of sandstone, shale, coal, fireclay, etc., are now presented. The accumulating mass in the slow course of time became firm. Pressure, the internal heat of the earth, chemical laws of change all combined to make the peaty mass a layer of carbon with a small percentage of ash, and of bituminous forming matter; the sand layers were cemented by silica into hard sandstone, the mud into bituminous or carbonaceous shale; and the ancient soil well robbed of its alkali; and silica became fireclay.

Almost without exception every bed of coal the miner explores has immediately below it a bed of fireclay often filled with carbonized roots. The coal bears in its structure the evidence of its vegetable origin, for under the microscope can be seen in it, fruits, flowers, and particles of wood fibre, etc. Above the coal comes the roof usually of shale or sandstone, often bearing in it at the junction with the coal bed, layers of ferns, pressed and preserved as in a herbarium; or a full length tree of that ancient forest showing in its flattened stem clearly and distinctly its species, etc., and recalling with its darkened color the logs found in our peat swamps.

We have now briefly traced the coal seam to its full growth, but had nature gone on adding the coral, the chalk, and all the varied and immense layers of subsequent formations this precious heritage would have been like an estate in chancery, pleasant to think about, but a thing unattainable, for we could not have sunk shafts some four or five thousand feet to provide our fuel.

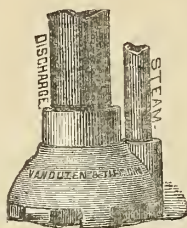
The process of nature which has laid these stores of fossil fuel close to the surface in Cape Breton is one as yet little understood by geologists, but it is a subject fascinating from its grandeur, and to its operations do we owe all our mines. There have been elevations and depressions in the earth's surface ever since its creation, caused by internal forces, contraction of its crust, accumulation of sediments, or what not, we see the effect, and bless the hand that guided the cause. In the Sydney district it appears that the old, old rocks, the granites and gneisses of Coxheath, Boisdale and St. Ann's were forced slowly and gradually upwards. This motion forced a tilting of the strata holding the coal so that they inclined to the east-ward. This was continued until the "Atlantic" of that date came in upon the land, and had boundaries approximating those of the present day.

(To be continued.)

*Transactions of the Mining Institute of Scotland vol. ix, pp. 138-145.

†From "The Carboniferous of Cape Breton;" a series of papers read at Halifax.

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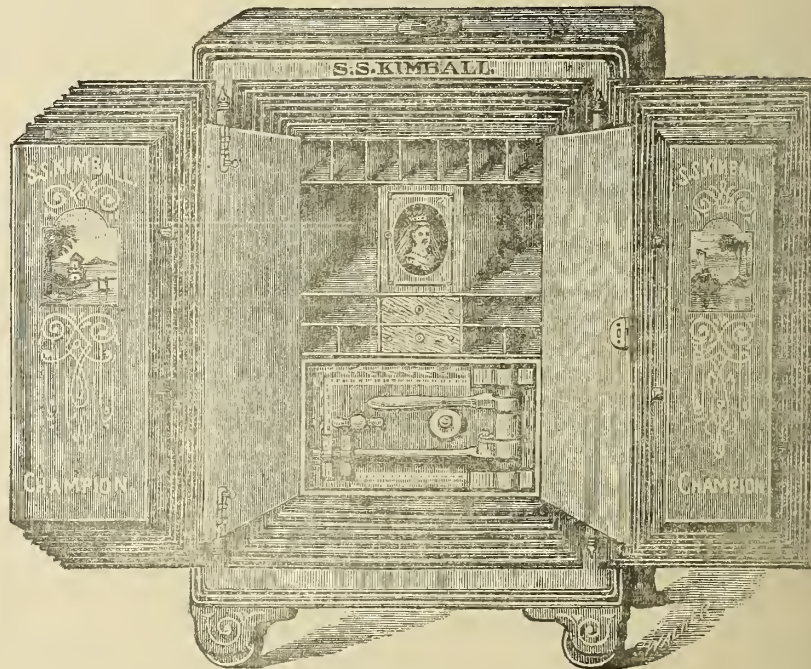
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Mining Regulations

TO GOVERN THE DISPOSAL OF

Mineral Lands other than Coal Lands, 1886.

THESE REGULATIONS shall be applicable to all Dominion Lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, iron or other mineral deposits of economic value, with the exception of coal.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein either by surface or subterranean prospecting for mineral deposits, with a view to obtaining under the Regulations a mining location for the same, but no mining location or mining claim shall be granted until the discovery of the vein, lode or deposit of mineral or metal within the limits of the location or claim.

QUARTZ MINING.

A location for mining, except for iron on veins, lodes or ledges of quartz or other rock in place shall not exceed forty acres in area. Its length shall not be more than three times its breadth and its surface boundary shall be four straight lines, the opposite sides of which shall be parallel, except where prior locations would prevent, in which case it may be of such a shape as may be approved of by the Superintendent of Mining.

Any person having discovered a mineral deposit may obtain a mining location therefor, in the manner set forth in the Regulations which provides for the character of the survey and the marks necessary to designate the location on the ground.

When the location has been marked conformably to the requirements of the Regulations, the claimant shall within sixty days thereafter, file with the local agent in the Dominion Land Office for the district in which the location is situated, a declaration or oath setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as aforesaid; and shall, along with such declaration, pay to the said agent an entry fee of FIVE DOLLARS. The agent's receipt for such fee will be the claimant's authority to enter into possession of the location applied for.

At any time before the expiration of FIVE years from the date of his obtaining the agent's receipt it shall be open to the claimant to purchase the location on filing with the local agent proof that he has expended not less than FIVE HUNDRED DOLLARS in actual mining operations on the same; but the claimant is required, before the expiration of each of the five years, to prove that he has performed not less than ONE HUNDRED DOLLARS' worth of labor during the year in the actual development of his claim, and at the same time obtain a renewal of his location receipt, for which he is required to pay a fee of FIVE DOLLARS.

The price to be paid for a mining location shall be at the rate of FIVE DOLLARS PER ACRE, cash, and the sum of FIFTY DOLLARS extra for the survey of the same.

No more than one mining location shall be granted to any individual claimant upon the same lode or vein.

IRON.

The Minister of the Interior may grant a location for the mining of iron, not exceeding 160 acres in area which shall be bounded by north and south and east and west lines astronomically, and its breadth shall equal its length. Provided that should any person making an application purporting to be for the purpose of

mining iron thus obtain, whether in good faith or fraudulently, possession of a valuable mineral deposit other than iron, his right in such deposit shall be restricted to the area prescribed by the Regulations for other minerals, and the rest of the location shall revert to the Crown for such disposition as the Minister may direct.

The regulations also provide for the manner in which land may be acquired for milling purposes, reduction works or other works incidental to mining operations.

Locations taken up prior to this date may, until the 1st of August, 1886, be re-marked and re-entered in conformity with the Regulations without payment of new fees in cases where no existing interests would thereby be prejudicially affected.

PLACER MINING.

The Regulations laid down in respect to quartz mining shall be applicable to placer mining as far as they relate to entries, entry fees, assignments, marking of localities, agents' receipts, and generally where they can be applied.

The nature and size of placer mining claims are provided for in the Regulations, including bar, dry, bench, creek or hill diggings, and the RIGHTS AND DUTIES OF MINERS are fully set forth.

The Regulations apply also to

BED-ROCK FLUMES, DRAINAGE OF MINES AND DITCHES.

The GENERAL PROVISIONS of the Regulations include the interpretation of expressions used therein; how disputes shall be heard and adjudicated upon; under what circumstances miners shall be entitled to absent themselves from their locations or diggings, etc., etc.

THE SCHEDULE OF MINING REGULATIONS

Contains the forms to be observed in the drawing up of all documents such as:— "Application and affidavit of discoverer of quartz mine." "Receipt for fee paid by applicant for mining location." "Receipt for fee on extension of time for purchase of a mining location." "Patent of a mining location." "Certificate of the assignment of a mining location." "Application for grant for placer mining and affidavit of applicant." "Grant for placer mining." "Certificate of the assignment of a placer mining claim." "Grant to a bed rock flume company." "Grant for drainage." "Grant of right to divert water and construct ditches."

Since the publication, in 1884, of the Mining Regulations to govern the disposal of Dominion Mineral Lands the same have been carefully and thoroughly revised with a view to ensure ample protection to the public interests; and at the same time to encourage the prospector and miner in order that the mineral resources may be made valuable by development.

COPIES OF THE REGULATIONS MAY BE OBTAINED UPON APPLICATION TO THE DEPARTMENT OF THE INTERIOR

A. M. BURGESS,

Deputy Minister of the Interior.

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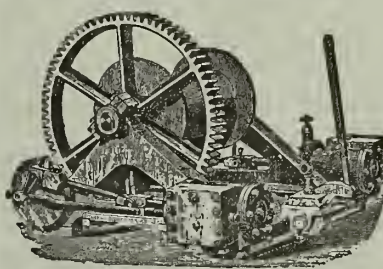
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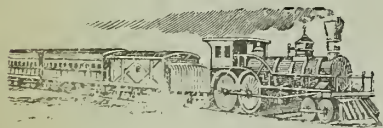
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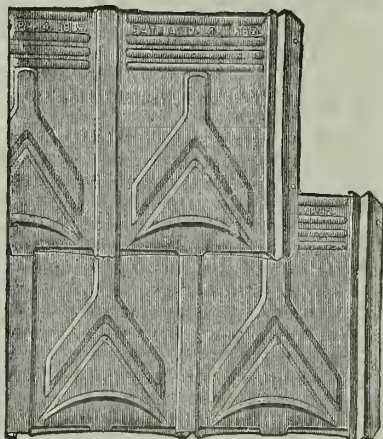
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A Hand-drilling Contest.—A drilling contest at Evergreen Lakes, near Leadville, Colo., on 29th ulto., between N. Meyer and John Ahern, resulted in the former drilling a drive back hole in granite 20¾ inches in fifteen minutes, and the latter 17¼ inches in the same space of time.

Miners' Hospitals.—A sum of \$60,000 has been appropriated by the State for three cottage hospitals for miners in the bituminous coal regions of Pennsylvania. The hospitals are to cost \$20,000 each. One will probably be located in Connellsville; another will go to the Mercer coal fields, while Clearfield will get the third. They will be large enough for, perhaps, thirty beds.

New Electric Drill.—An electric drill weighing 100 pounds, and that makes a hole three feet deep in hard anthracite in 30 seconds, and one six feet deep in 1½ minutes, is the latest thing in electric drilling machines. It is designed by Mr. W. M. Schlesinger, and made by the Union Electric Company of Philadelphia.

The Profits of a Great Mine.—As an example of how profitable mining investments may be, we give the magnificent example of the celebrated Calumet and Hecla mines. The original assessments were \$15 a share on the Calumet and \$25 a share on the Hecla, each of which had 20,000 shares. This would account for only \$800,000 paid in, but it is generally stated that the total amount of money paid in on the consolidated stock was \$1,200,000. The mine has paid in dividends no less than \$30,850,000, or about \$25 for every \$1 paid in, or about \$1.20 a year on \$1 invested. This, however, is not all; out of surplus earnings immense sums have been invested in additional property, and in gigantic (though in great part unsuitable or unnecessary) machinery. So that the property to-day is selling at the rate of about \$30,000,000, which would represent at least another \$25 on the \$1 invested. An investor who contributed to the original assessments, held his stock until the present time, and sold out this week, would therefore have received \$50 for every dollar he originally paid in.

Securite.—The new famous explosive, emits a spark in exploding, but this spark is harmless, not possessing sufficient energy to explode inflammable gases or coal dust. By the action of the organic salt the spark is almost instantly extinguished. In the tests mentioned, the flameless "securite" was exploded in vessels containing the most highly explosive mixture of gas and air, and, in some cases, this combined with coal dust, but, while gunpowder invariably causes their explosion, the flameless "securite" did not ignite the gas, or the coal dust, and it was demonstrated to be safe, even under more severe tests and conditions than are ever present in mining operations.

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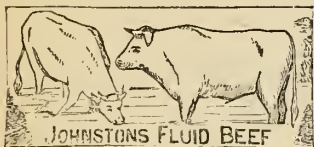
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Steel Manufacture in Nova Scotia.

Mr. J. H. Bartlett, M. E., (1) Montreal, sends the following description of the Nova Scotia Steel Works:—New Glasgow ranks among the most enterprising and progressive towns in the Maritime Provinces. It is situated at the head of navigation on the East River, which flows into Pictou Harbor. The famous Pictou coal mines are in the immediate vicinity, with all of which New Glasgow is connected by rail. The town is also connected with the Intercolonial Railway at Turo, by the Pictou Branch, with the Straits of Canso by Eastern Extension, and with Pictou by the Stellarton Pictou branch. With such an advantageous position and surrounded by a fine agricultural country, it is hardly a matter of surprise that New Glasgow is outstripping its sister town, Pictou, the shire town of the county. The principal iron works are at Trenton, about a mile below New Glasgow. Indeed the village of Trenton has grown up around the works since their establishment. The Nova Scotia Steel Works, which were established in 1882, have invested in them a paid-up capital of \$280,000, two-thirds of which stock is owned by citizens of New Glasgow. Some of the stock is also owned in Halifax, Pictou, Montreal and other places—Sir D. A. Smith being one of the Montreal shareholders. The works occupy about ten acres of land—the main building, 410 feet by 130 feet, covering over 80,000 feet. Extensions are being made to the buildings, which will cover 25,000 feet additional. Nearly two miles of railway track are in operation in and about the works, which will be largely increased by sidings not being laid down. The principal items of plant are the following: Two open-hearth steel-melting furnaces—one 15 and the other 20 tons capacity; five re-heating reverberatory furnaces; two re-heating Siemens gas furnaces. The machinery comprises one 26-inch cogging mill, fully equipped with live rolls, hot billet shears, etc.; a 22 inch sheet mill; a 17-inch nail-plate mill—these are driven by a pair of compound condensing engines of twelve hundred horse-power; a 16-inch bar mill; a 9-inch merchants' bar mill—these are driven by a high pressure engine of 800 horse-power; plate and cropping shears; one steam travelling crane of 10 tons capacity; a number of steam hammers—in all, there are 40 steam

cylinders in operation in the works from the 30 inch cogging mill engines down to 6-inch cylinders; one heavy roll turning lathe, driven by an independent engine. In the steel spring tempering department are heating and annealing furnaces, drop hammers and all other plant necessary for the rapid production, in large quantities, of springs and teeth for agricultural implements. In another department are the necessary shears and punches for the production, on a large scale, of railway fish plates, both bar and angle; tie plates, plow plates, etc. In the machine shop are all the usual and necessary plant for such an establishment, such as planers, lathes, drills, etc. The product of the works consists largely of steel for agricultural implements, together with the usual sizes of merchants' steel, in rounds, flats and squares, with angles and special sections. A large quantity of spring steel is also made. Rivet steel, of specially low carbon, is also manufactured, besides tramway and pit rails; nail and plough plate, and large quantities of "sections." The works are well supplied with water, the New Glasgow system having been extended to Trenton. Being situated, as already stated, on the Pictou Branch Railway, and along side the East River, the company has excellent facilities for shipment of products, both by rail and water. The bulk of the output, however, passes over the I. C. R. for consumption in the Upper Provinces. In 1884 the shipments from the establishment were only 2,270 tons; last year, 1887, they amounted to about 6,000 tons, and when the plant now being put in is completed, the works will have a capacity of 12,000 tons, and no difficulty is anticipated in disposing of the increased production. Gold and silver medals are held by the company from Dominion exhibitions. At the present time there are 225 men on the pay list, and the monthly pay is about \$3,000. The number of men will be increased to 300 when the additions to the works are completed. The company are paying dividend's, both on its original and preferential stock. Its success is due largely to the fact that the directors are hard-headed, practical business men, while the managing director has a practical knowledge of the requirements of such an establishment, and gives close personal supervision to all departments of the work.

Nova Scotia Collieries.

From a report printed by the Department of State at Washington, giving colliery statistics of Nova Scotia, for 1887, we obtain the following facts: Number of collieries 19; of this total, 3 belong to the Cumberland Company, 4 to the Pictou Company, 11 to the Cape Breton Company and one to the Inverness Company. At all the collieries there were employed above ground 1,885 skilled laborers, 680 laborers and 586 boys, the total number of labor days being 733,824, which is equal to 233 days worked by each employee during the year. There were employed above ground, 372 skilled laborers, 635 laborers, and 154 boys, the total number of working days being 304,820, or 262 days for each employee. There were employed in construction, 81 skilled laborers, 11 laborers and 3 boys, the average number of days worked by each being 245. The total number of persons employed underground, above ground and in construction, was 4,367. The average number of tons produced per cutter, ranged from 162 to 1,186. The average number of tons per day during the year, by each colliery, ranged from 27 tons to 1,622 tons. The number of days each pit was worked, ranged from 106 days to 296.

The Canadian Mining Review

CONDUCTED BY B. T. A. BELL.

OFFICES:

UNION CHAMBERS, 14 Metcalfe St.

OTTAWA.

Vol. VI. SEPTEMBER, 1888. No. 9.

Judge Burbidge's Verdict in the Frase Case.

The lands, the expropriation of which gives rise to the present claim, are situated in the Township of Portland, in the County of Ottawa and Province of Quebec.

They consist of three portions of lot number eight in the first range of the said township, and were required by the Crown for certain public works in course of construction on the River du Lievre.

One parcel containing eleven one hundredths of an acre was situated on the south bank of the said river, and formed part of the south half of said lot number eight.

A second parcel containing 5.03 acres was situated on the north bank of said river, and also formed part of the south half of said lot.

The third parcel containing 14.43 acres, and adjoining the parcel last mentioned, formed part of the north half of said lot.

I shall refer to these several parcels in the order named by the letters A, B, and C respectively.

The plan and description, by the depositing of which the Crown acquired title to these parcels, were deposited in the office of the Registrar of Deeds for the County of Ottawa on the first day of August, 1887. By a notice dated December 9th, 1887, and filed with the registrar of this court on the 5th day of January, 1888, the Minister of Public Works notified such registrar of his readiness to pay to the persons entitled the sum of two thousand two hundred dollars, which in his opinion was sufficient compensation. The notice required by the Expropriation Act having been duly published, Alexander Fraser filed a claim to the compensation money, alleging that he acquired title to the said lands by deed on or about the first day of February, 1888, and that the amount offered by the minister was insufficient, and claiming forty thousand dollars. By the statement in defence the Attorney General denied that the claimant acquired title to the said lands on or about the first day of February, 1888, and alleged that he was not entitled to such compensation money.

To this the claimant replied that by virtue of the deed mentioned he was entitled to any compensation money which might be found to be payable to the person from whom he purchased the said lands, and issue was joined thereon.

On the trial claimant put in evidence: (a) A deed of parcels, "A," "B" and "C," from Donald McMillan, Angus McMillan and others to the claimant, bearing date February 1st, 1888, and registered on the 8th day of the same month. (b) A deed dated June 10th, 1865, and registered April 2nd, 1887, from Duncan McMillan to Angus McMillan.

The description of the several parcels mentioned in the deed from Donald McMillan and others to the claimant, corresponded exactly with that used in the plan and description deposited by the Minister of Public Works in the registry office on the first of August, 1887.

The land mentioned in the deed of 1885, from Donald McMillan to Angus McMillan, is described as being the eastern half of lot number

eight in the first concession of Portland. This deed was made, subject to certain charges, for the benefit and support of the grantor and his wife. In his evidence Angus McMillan states that his father, Donald McMillan, was possessed of said lot number eight for some twenty-two years before 1885, and that since that date he (Angus) had under his deed, aforesaid, been in possession of that portion of the lot which was north of the river, including parcels "B" and "C," the description in the deed being alleged to be an error. He also stated, the portion of lot eight, which included parcel "A," had been in the possession of his brother, Duncan McMillan, one of the parties to the deed to the claimants, for some twenty-seven years, being previously thereto in possession of their father.

At the conclusion of the claimant's case, I was of opinion that he had never acquired title to the lands in question, and that the deed to him from Donald McMillan and others was not an assignment of the compensation money due from the Crown, even if as against the Crown such compensation money could be effectually assigned. It was, however, perfectly clear, from the evidence, that the McMillans intended that the claimant should, as against the Crown, stand in their stead, except so far as the question of costs was concerned. It became unnecessary, however, to come to any conclusion on the questions as to whether or not the claim could have been and had been assigned, as, on motion of counsel for the claimant, I made an order to add the McMillans as parties, and this being done, the latter appeared and agreed to be bound by the proceedings taken, and consented that any moneys awarded herein should be paid to the claimant, Fraser.

With reference to the compensation, it will be seen from the evidence that the property, part of which was expropriated, was used as a farm and as a stopping place for travellers.

It is clear, too, I think, that apart from this the property on August 1st, 1887, had an additional value by reason of the indications of phosphate therein.

With reference to the value to the owner of the portions expropriated, apart from the chance of phosphate being found therein in paying quantities, the witnesses did not in their estimates thereof differ more than is usual in such cases. Angus McMillan, for the claimant, places their value at \$1,900.00, and for the defendant McNaughton, Brazeau and Woods at \$3,000.00, and Holland and Carroll at \$2,000.00.

With reference to their value for mining purposes, the estimates made by the witnesses, as was natural, differed more widely. Angus McMillan gives an unsatisfactory account of an offer of \$3,000.00 for the mineral rights in the property, and a more unsatisfactory account of a refusal of \$10,000.00 for the same. The general result of the evidence given by Stanislaus Franchot, is that on August 1st, 1887, the property expropriated might be considered to have been fairly worth \$10,000.00 for mining purposes. Robert Henwood, who did not see the property until February, 1888, and after the contractor for the Government had made excavations on the bank of the river at the place where the vein of phosphate was exposed, valued the property from \$20,000.00 to \$40,000.00. Mr. Henwood stated that while he could not put a value on the property as of August 1st, 1887, he estimated such value at \$10,000.00.

For the Crown it was shown that the vein of phosphate, the existence of which gave value to the property, had been partially but unsuccessful-

fully developed, and had been abandoned. Archibald McNaughton who, although called by the claimant, is, so far as this part of his evidence is concerned, to be treated as a witness for the defence, stated that he would not have given \$1,000.00 for the mineral rights in the property. Andrew Holland testified that he would not have risked more than \$5,000.00 therein, while Brazeau says that if he had owned the property he would have sold the portions expropriated for \$6,000.00, but would not have given that sum for them.

Apart from this we have the fact that the McMillans sold to the claimant for \$6,000.00. It might happen that one would accept evidence of this kind with suspicion, but in this case there is nothing to lead one to suspect that the sale was a pretended one, and made for the purpose of giving a value to the property.

Mr. Hogg, for the Crown, contended that as the claimant on his own case was not entitled to recover against the Crown, and as the McMillans did not file any claim, it was not open for them to attack the sufficiency of the amount offered by the Minister. It is possible that I did not give sufficient weight to this consideration in making the order to add parties, but having made that order, I think it was open to the claimants or any of them, to question such sufficiency. Looking again at the evidence, I think that Franchot's experience entitles his views to very careful consideration. It is to be borne in mind, however, that the value to the owners on August 1st, 1887, of the mineral rights in the properties expropriated was (as it still is) speculation and that it depended upon what was then known in respect to them. For the purpose, therefore, of fixing such values, the opinions of such witnesses as McNaughton, Holland and Brazeau, who had known the property, and who had had some experience, though not as great, or exactly of the same kind as Franchot's, are also to be carefully weighed. On the side, too, of their lower estimates, is the sale by the McMillans to Fraser, as well as the facts that this property was on the line of travel, that the indications of phosphates, such as they were, were, readily observable at a short distance from the house, which was used as a stopping place, and that apart from the abortive attempt of Garrett & Roberts to develop the mine, there was evidence of no more substantial negotiations for the sale of such mineral rights than the alleged transaction with the stranger Barker.

On the whole evidence I think that \$6,000 is the maximum sum at which I would be justified in assessing the compensation moneys. If Fraser's purchase had been one in the ordinary way of business, either for the purpose of developing the mine, or for speculation therein as a mining property, and not an attempt to speculate in a claim against the Crown, I would have had less hesitation on this point. I assess the compensation money to be paid in this matter at \$6,000, to which will be added interest from August 1st, 1887. Each party will pay his own costs.

The Sudbury Copper Mines.

The following evidence, given by Dr. Peters, of the Canada Copper Company, before the Ontario Mining Commission, contains some interesting information regarding the working of these mines. We reproduce it from the *Globe* :—

The ore throughout the country is uniform as far as I have seen. Whether it would pay for copper alone would be a toss-up. If coke could be got at \$6 a ton, a reasonable dividend

might be paid under good management. Mining would cost \$2 a ton, breaking 30 cents, calcining 50 cents, and smelting into matte \$2.50—that is, assuming a large quantity to be treated. A ton of matte containing 25 per cent copper would be worth \$40 to \$45 in the United States market; that is, taking into account the duty, but not the transport. If we were smelting for copper we would use ore with a higher percentage of that metal. The present price of nickel is 65 cents a pound, which I consider to be rather high; if it was 25 to 30 cents much more of it would be used. The present consumption is about 1000 tons annually, and that is principally used for plating. I think we might sell it with a handsome profit at 25 to 30 cents. I think there is an ample supply of ore here.

It is a hard country to prospect, as the rocks do not crop out well. If this was in the United States thousands of prospectors would be here on the strength of what has been already done. There seems to be some connection between the deposits in this section, but I do not think they could be called fissure veins. I would describe them as forming a mineralized belt, with the minerals concentrated at certain points. I think the Canada Copper Company have sufficient stock of ore on hand to represent every dollar they have expended here, and to build the smelting works besides. Of course, that is only an opinion, but it is based on pretty good evidence.

Dr. Peters said openings have been made in the Stobie, Evans and Copper Cliff mines, as well as at four or five other places to prove veins. At the Copper Cliff mine some \$25,000 or \$30,000 have been expended. We have sunk down about 350 feet on the vein, and drifts have been run at right angles to the shaft some 600 feet, besides which a great deal of surface clearing has been done. On the Evans vein the shaft has been sunk to a depth of 85 feet. At the Stobie mine two tunnels, 30 or 40 feet, have been run in, and a considerable quantity of ore has been quarried. There is at this mine a three-drill compressor, a large stone-breaker, the necessary pumps, etc. At the Copper Cliff we have a six-drill compressor, a large hoisting engine, a rock-breaker, a rock-house for separating ore, several pumps, and all necessary machinery. As regards the Evans mine, a three-drill compressor will be set up in about a week, also a breaker, which is on its way, and there will be erected a very large rock-house.

The company have not yet attempted to treat the ores, but about 3,000 tons have been shipped for treatment elsewhere. It smelts easily, but the combination of nickel and copper has not been met with before in such quantities as to require separation in a wholesale way. The only other mine of the kind in America is the "Gap" mine, of Pennsylvania, and there they use the old European way of dissolving in acids, which would never do for our works.

The process I approve of for treatment of our copper ores is the old German blast-furnace method, modified to suit American conditions. You first sort the ore, break it to the proper size, pile it upon wood in large heaps, and then set fire to the wood. It burns for two or three months, sending forth the sulphurous acid gas till about three-fourths of the sulphur is gone. The ore that originally carried 35 or 40 per cent should come out with 4 or 5 per cent. The iron is changed into oxide of iron, and is just like common iron ore, having lost its sulphur and taken up oxygen instead. The ore is then put into the blast furnace, treated on

the same principle as pig-iron, and the sulphur combines with the metallic constituents which form the matte.

The composition of the matte may be 30 per cent sulphur, 20 per cent nickel, and 20 to 25 per cent copper. Six tons of ore will produce one ton of matte. We are not yet in a position to say which of our mines is the most valuable, but as they now look I think the Evans promises to be better than any other. It carries about the same amount of nickel as the other mines, but the ore is more massive, and apparently there is a larger body of it. I think the Evans will show, taking an average of the whole mass, $3\frac{1}{2}$ per cent nickel, 3 per cent copper, 40 per cent iron and 24 per cent sulphur, leaving say 30 per cent of rock. I consider the company justified in putting up large works, and have so advised them this spring. As a rule I only advise the erection of reducing-works when I see enough ore mined to pay their cost, and that is the case here. We shall have to get the matte refined elsewhere.

The sending of a large quantity of nickel matte into the States has never yet been tested, but Americans are so much more ready to alter their plant and undertake any new thing of the kind than Europeans that I think we shall be able to do better in the United States than anywhere else. In shipping to the States we have to pay duty on the metal that is of most value in the matte. Were the duty taken off it would of course be an advantage to that extent, unless the price falls and upsets the gain. I think we can dress a good deal of our ore to 20 per cent, and, speaking in the aggregate, I think it will show $2\frac{1}{2}$ per cent nickel, and 3 per cent copper. I understand that before I came here three shipments were made, one of which went to England, two to the United States. The company did not realize one dollar a ton on the shipment to Swansea, the charges were so exorbitant there. The ore carried 12 per cent of copper, and the nickel in it was worth \$35 to the ton. But the smelters allowed nothing for the nickel, and on the thousand tons smelted there was a loss of \$35,000, a large quantity of which was shipped from the Copper Cliff. We figured up that the charge for smelting was \$50 a ton, whereas our eastern men only charge \$10 per ton.



Shipments.

The following are the Shipments from Montreal for month ending September 12th, 1888:—

Date.	Name of Vessel	Destination.	Shippers.	Quantity.
Aug. 21	Henry IV.	Bordeaux.	Le mer, Rchr & Co	400

The very small quantity shipped is accounted for by the scarcity of phosphate tonnage from Montreal.

In General.

Mr. T. W. Hotchkiss, American Consul at Ottawa, has kindly furnished us with the following particulars relative to the value of phosphates shipped from the Ottawa district to different points in the United States. The quantities were all ground phosphate.

Phosphates exported for fiscal year ending 30th June:—

1884.....	Nil.
1885.....	\$775
1886.....	\$1,106
1887.....	\$5,467
1888.....	\$6,913

Perth District.

The Anglo-Canadian Co. are doing well with contract work at the Otty Lake Mines, North Burgess, and the Bobb's Lake Mines, Bedford, Ontario. At the latter, during the past month, 11 men and two boys mined, cobbled, and piled ready for market 150 tons of high quality phosphate, this mine being peculiarly rich in crystals. At Otty Lake 13 men mined 74 tons, this being about the average output of our best mines—six tons per month per man. Work was begun also for this company at their Lake Tassie Mines in the Gore of Templeton, and they are endeavouring to procure more men to take out phosphate there by contract.

Freights.

Owing to the rise in ocean freights and the diversion of tonnage from the St. Lawrence to Atlantic ports, where higher rates prevail, there is a scarcity of phosphate tonnage from Montreal. Twelve shillings and sixpence is asked for London, and the supply of room is very limited. There is a good deal of phosphate yet to go forward to fill contracts, besides some that is as yet unsold.

Markets.

Freights from Charleston have advanced considerably, and Carolina phosphate, which has been sold in England at 6 $\frac{3}{4}$ d. per unit, is now worth 9d. there. This occasions more demand for Canadian low grade phosphates, and considerable quantities of sixty to seventy per cent. might be sold. In the past few years the demand has been almost wholly for eighty per cent. Canadian, and our mines have been carefully selecting their ores and keeping up the quality, so that the supply of the lower grades is limited. The price at the main English ports is 8 $\frac{1}{2}$ d per unit for 70 per cent., with $\frac{1}{2}$ d per unit rise. For outports $\frac{1}{2}$ d more could be had. The price for 80 per cent. phosphate is nominal at 11d. and 11 $\frac{1}{2}$ d. per unit, as there have been no transactions in this grade lately. The French phosphate from the Somme district continue to be largely used in England in preference to all others, and as they analyse from 70 to 75 per cent., they are formidable competitors with Canadian, especially as they are softer, and are sold in a condition that requires, as a rule, no further grinding. It is believed, however, that the supply is limited, and that in two years, if the present rate of production is continued, it will be exhausted. The demand from the United States for Canadian phosphate is steadily increasing, and that market promises to furnish an important outlet for the production in the future.

Kingston District.

The present depth of the shaft at the Foxton mine is 115 feet. The vein is from 8 to 15 feet wide and improves as increased depth is obtained.

Lievre District.

Since our last, 140 tons of ground phosphate have been shipped to Chicago by the Du Lievre Milling and Mining Company of Seabury.

The demand for ground phosphate is steadily increasing. The mills of the Du Lievre Company are kept very busy, and night gangs have

been put on in order to work the mill, night and day, to its fullest capacity. We understand that the management have in contemplation the trial of a new grinder which promises to double the output. The management, we are glad to say, have a large number of orders on hand, and the new machinery, it is thought, will barely meet the demand for their ground phosphate, which seems to be growing in a most encouraging manner.

At High Rock the management have struck one of the richest shows ever found at these productive mines. Ninety tons of high grade ore were mined recently in one day.

The Canadian Company's Mines also never looked better. A fine show has been uncovered at the Dugway, and a very rich vein, 17 yards long by 4 yards wide, has recently been opened up, and gives promise of an abundant output of firsts. The new wire rope tramway has been completed and is giving satisfaction. The steamer River Belle has been refitted with new boilers, etc.

Captain J. E. Smith, for the past six years general superintendent of the old Union Co.'s mines, and later of the Canadian Company, has resigned his position, and will in future reside in the States. The familiar figure of the genial Captain will be missed on the river.

At North Star Mines there is a good force at work and large quantities of phosphate are being shipped.

We are glad to note an improvement in the quantity of output from the Emerald.

Mr. W. C. Kendall, of Bassin du Lievre, is reported to have opened up some exceedingly promising shows on his lots up the river.

At South Uniacke a new crusher is approaching completion.

At the Malaga District, Queen's County, the Malaga Mining Co. have started their new mill, and it is confidently expected that this locality will replace Sherbrooke, which was the leading district for many years. The Provincial Government have given a large sum to assist in placing Malaga mining within easy reach of the seaboard by building a short-cut road.

At Lochaber, on the Sheet Harbor waters, an English company, represented by the manager of the Halifax Cotton Factory, has contracted for the immediate delivering of a 20-stamp mill.

No new discoveries of gold are reported, the unusually wet weather having kept the prospectors out of the woods.

Further explorations in the Pictou Iron Districts have shown a 15 foot bed of red hematite in an area belonging to Mr. S. H. Holmes, of Halifax.

The red hematite property owned by Messrs. Greener & Ingraham is being opened up to permit shipments of some trial cargoes. The ore is reported to be high in iron and low in phosphorus, and as being admirably adapted for the American market.

The gold mines of Nova Scotia continue to show fair yields, the returns from seven mines for the month of August giving 567 ounces of gold from about 1,280 tons of quartz rock put through the crushers. Some new mines have recently been discovered, and it is expected the output of the present year will show an increased activity in this branch of mining.

New Brunswick.

The Grand Lake Coal Company has been organized, with a capital stock of \$200,000; shares \$100 each. The chief place of business is to be Chipman, Queen's County. The incorporators are Dr. Louis G. DeBertram, of New York, John P. Illsey, of Philadelphia, engineer; Thomas M. Williamson, of Buctouche, Kent County, civil engineer; Edward W. Clark, Jr., Edward E. Denniston, C. Ford Stevens, all bankers of Philadelphia.

Quebec.

Large specimens, some of them weighing 9 ounces, have been brought in from the McArthur gold property at Beauce.

The first meeting of the shareholders of Bell's Asbestos Company was held on Wednesday afternoon, 15th ult., at the Cannon-street Hotel, London, under the presidency of Mr. John Bell. The chairman said the company had completed the transactions for acquiring the asbestos mines in Canada, and they had now possession of one-third of the world's supply of the kind of asbestos known as Bell's asbestos, which was capable of being woven or spun into a material like flax. The company had already 15,000 customers among the general public on their books, and the material they traded with was of such a unique and important character that its use would sure to be soon applied to purposes at present unknown. The trade is expanding day by day, and he looked forward to the time when the use of this fibre, which is a fibre unique in every part of the world, unconsumable and incorruptible, will extend to a variety of pur-

poses that are unknown now; and whatever may be the good or evil fortune of their ordinary trade as manufacturers, the corporation was rapidly approaching the time when the produce of these mines will themselves constitute a permanent and splendid dividend on the capital of the corporation. A meeting would be held at the close of the year for the presentation of accounts and the declaration of a dividend.

So pleased were the shareholders with their interim dividend of 7s. 6d. per share, and the encouraging statement that the chairman was able to lay before them, that not a single question was asked. It should be borne in mind that this dividend of 7s. 6d. per share, or at the rate of 15 per cent. per annum, does not include any of the Canadian profits, which will come into the second half-year, and there seems, therefore, every probability that future dividends will be at a higher rate, for the company, as stated at the meeting, can now take front rank not only as manufacturers, but also as producers of the raw material. Mr. John Bell is a gentleman most thoroughly versed in the subject of asbestos and its uses, and was the first to spin it into yarn for weaving into cloth. The various specimens of crude and manufactured asbestos exhibited at the meeting were examined with much interest by the shareholders.

Mr. John Bell, President of the Company, has, since the meeting, arrived in Canada, and is at present visiting the company's properties in the eastern townships. Dr. James Reed, of Reedsdale, accompanied Mr. Bell on his tour through the mining districts.

There are stirring times at the Graphite City Plumbago mines near Buckingham; some twenty men are employed in rebuilding the mills, etc., under the superintendence of Mr. W. C. Kendall. A substantial new stone-built engine-house, 45 by 25, is also being built. The whole of the buildings are to be put in first-class condition. The tramway to mines is also to be rebuilt, and will be ready for next season's business. The most improved machinery will be used in crushing the material, which can be done at a much less cost now than with the old style of battering rams, formerly in use but now out of date.

Ontario.

The new terra cotta works being built at Deseronto by the Rathbun Company will be the largest in Canada. The main building is 252 feet in length and 77 feet wide. The south-east extension is 180x40 feet, with three storeys, and is chiefly used for drying purposes. The south wing is 170x96 feet, three storeys high. Part of its ground floor is fitted up with hot-air tunnels for drying red brick; the other floors are used for drying terra cotta ware. In the south wing the different floors give an area of 38,760 feet for drying purposes, and this, added to the 21,600 feet in the main building, gives a total area for drying purposes of 60,360 feet. A large trestle runs through the entire length of the main building, on which runs the railway cars carrying in clay and fuel for the works. The new burning kiln has been finished, and will contain about 80,000 bricks. A track runs south of the large burning kiln for convenience in loading cars for shipment of material.

The grading of the line of the Pontiac & Renfrew Railway, which is being built with the special object of tapping the Bristol Iron Mines, will be completed, ready for the rails, by the end of the present month.



We shall be greatly obliged to mine owners and superintendents for such authentic reports of their operations as may concern shareholders and the public.

Nova Scotia.

The following are the official returns so far received at the Mines Office for the month of August:—

District.	Mill.	Tons Crushed.	Ozs. Gold.
Sherbrooke....	Miners.....	200	43½
Rawdon.....	United M. Co.....	65	28
Stormont.....	Island G. M. Co.....	252	294½
Wine Harbor..	Napier.....	68	42½
Lake Catcha..	Oxford G. M. Co.....	173	200½
Salmon River..	Dufferin.....	890	252
Uniacke.....	Nicholls.....	106	15
Millisgate....	Owens.....	3	4
Moose River..	D. Touquoy.....	351½	59½
Cariboo.....	Lake Lode M. Co.....	99	102
South Uniacke.	Withrow.....	35	35½

Mr. E. Gilpin, Jr., Inspector of Mines, writes us as follows: "Our gold mining has not been very brisk this summer, but as several mines are approaching completion, I am in hopes that the returns will be increased before the fall."

The Northup Mines, at Rawdon, has had its plate crushing and the returns show about three ounces to the ton.

The Craig Gold Mine, in Tudor, has been bonded to Toronto parties for six months. This is a good property. The vein is about seven feet wide, and has been traced for a distance of about 800 feet. Assays made in Toronto and New York have given \$25 and \$33 in gold respectively.

Some parties have purchased the tailings of the Consolidated Company and are now washing and amalgamating them and are doing well.

The natural gas well at Thorold has now reached a depth of 320 feet. Work is very much retarded by water. Casing is now being put in to obviate this difficulty. The drill has struck, in addition to rock, the strata of salt; and at the depth of 230 feet a layer of apparently good soft coal twelve inches in thickness.

Gold is reported to have been found on lots 25 and 26 in the fourth concession of Storrington.

Sudbury District.

The Canada Copper Company have now six piles of copper ore burning, four of 250 to 300 tons, and two of 450 tons to 500 tons. Forty of the seventy-five feet of chimney is built, foundations for boiler and engines are ready, and everything points to rapid completion, and a start at smelting before winter. The Jenckes, Machine Co., of Sherbrooke, Que., are building the water jacket smelting cupola, which will be sent up here in sections. In mining, the management report an output last month of 3,000 tons of good smelting ore. The Copper Cliff has a depth of 385 feet on the dip, and a total length of drifts and cross-cuts of over 800 feet.

The Evans has a shaft 80 feet deep, at the bottom of which they have completed 30 feet of drifting. All this, shaft and drift is in good solid ore. In addition to this they have 100 feet face of good ore for quarrying.

At the Stobie the owners are still quarrying in ore, of which they have an enormous body.

Your correspondent has before mentioned the Ducharme property, in Blezard, to the north of the Stobie. The owner is at work with two men at present, and is making an open cut into the hill from the lowest point. This should, if appearances are not deceptive, soon show up a large body of good mixed sulphides.

The directors of the Vermillion Mining Company held a meeting at their property on the fourth of the month. A. J. Duncan resigned his position as manager, but still assumes control of affairs pending his replacement.

Mr. Jas Stobie recently sold a property on the Vermillion River, in Creighton, to Buffalo parties. The ore is a pyritous one, carrying good value in gold and silver, and will be worked to its best advantage.

Port Arthur District.

Great activity exists among prospectors and investors, and likely properties are being bonded with a view to development, but no marked improvement can take place in the mining region until operations on the railway to the mines are resumed. While it costs \$2.50 a hundred to take supplies and outfit into the silver properties west of Silver Mountain, none but the very richest silver outcroppings will be worked, and these only in a superficial manner, until the roads enables heavy machinery to be brought in.

The pumping and hoisting machinery for the Silver Mountain West End Mine is now on its way out, and when in place good progress will be made on this most attractive property. The principal shaft is being sunk in a point where the vein is about sixteen feet wide.

The East End Mine vein still holds out over six feet wide with abundance of metal, especially on the lower workings to the east.

Crown Point Mine still keeps a good showing.

The Beaver Mine has lately produced some very fine ore from the lowest levels, and is encouraging the management to look for another big haul.

The Badger still keeps the lead with surpassingly rich ore. The vein is small but valuable.

The Elgin Mine is under the control of Capt. Hooper, Superintendent of the Beaver Mine, who is putting matters here in a business shape, with a view of giving the property a good test.

The Silver Fox (264 T) is still progressing very slowly—the erection of the necessary buildings requiring most of the attention.

Negotiations for the sale of the Atik Lake and Silver Glance (R 230) locations still continue. The owners feel they have a good thing and are willing to wait for a railway if a reasonable cash offer is not forthcoming.

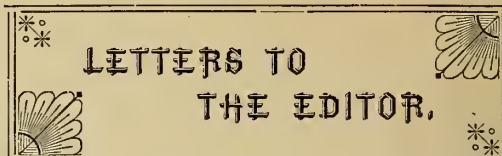
Development in the Black Bay lead mines is being pushed with good results, and the output of building stone (sandstone) from Nipigon Bay to Chicago is continually increasing.

The lands of the Silver Islet Consolidated Mining and Lands Company, which were sold by order of the Supreme Court of New York at public auction, in New York, on the 19th inst., were purchased by Mr. J. B. Anderson, of the American Exchange, National Bank, for \$5,000. Mr. Anderson refuses to state for what purpose this property, which is extensive, has been purchased. It is probable that he is simply the representative of parties who wish to conceal their identity.

British Columbia.

The Nanaimo *Free Press* reports that Messrs. Wm. Tree, Geo. Tippet, Alex. Easson and Richard Prouse returned on Thursday last from Texada Island, where they had discovered valuable ledges of silver, copper, and iron ore. The discoverers brought with them several bags of specimens, rich and beautiful in appearance. The ledges are situated on the Nanaimo side of Texada Island, and a mile north of the Texada Iron Mine, now being worked by the Irondale Smelting Works Company, of Puget Sound. Several different ledges were discovered and prospected for a distance of over a mile, with every indication of extending for miles further; in fact, the discoverers are of the opinion that the upper end of the island is a mass of minerals. The ledges will pay from the surface, and they are but a few yards from deep water, where large vessels can lay and take in cargoes of ore, at the lowest possible expense. The discoverers have already recorded ten claims of the size allowed by law. Specimens of this ore have been sent to San Francisco for assay, and the returns are of the most favourable character. Some of the ore

was also sent to the Government Assay Office, but no returns have yet been received. Local experts pronounce the samples rich, one large piece being almost pure copper.



We invite Correspondence upon matters consistent with the character of the REVIEW.

Be as brief as possible. The writers name in all cases required as a proof of good faith.

One dozen copies of the issue containing his communication will be mailed free to any correspondent on request.

We do not hold ourselves in any way responsible for the opinions expressed in this section of the REVIEW.

Our Mineral Resources.

TORONTO, 12th September, 1888.

The Editor

THE CANADIAN MINING REVIEW:

SIR,—A letter from Mr. Samuel D. Mills, in the last number of THE REVIEW, mentioning the ignorance of Canadians of their own mineral resources, suggests a few remarks. Such ignorance is unfortunately too prevalent. There are probably not a dozen people in Toronto who know anything about the iron ores which are found within 150 miles of their city, or who take any interest in them. Within the last fortnight I have received a letter from the General Manager of "The Cambria Iron Co.," in which he says: "Enclosed are analyses of the two qualities of ore you sent me. They are both first-class ores for making Bessemer metal or fine steel. They are unusually low in phosphorus and very high in iron, being:

	Metallic iron.	Phosphorus.	Sulphur.	Silica.
No. 1.	68.85	0.008	Traces	1.96
" 2.	69.99	0.012	"	3.10"

These ores come from a large deposit not much more than 100 miles from Toronto, from which several hundred tons a day could be easily mined.

An analysis by Professor Chapman of another ore about 125 miles from Toronto gave iron 63.68, sulphur 0.03, phosphorus trace.

An analysis made by "The Bethlehem Iron Co." of ore from the Paxton mine in Lutterworth Township, less than 110 miles from Toronto, shows 60 per cent. iron, very low in phosphorus, and no sulphur, the chemist remarking, "This is an excellent Bessemer ore."

Prof. Chapman makes two analyses of different ores from Township of Galway, about 110 miles from Toronto, viz.:

	Metallic iron.	Phosphorus.	Sulphur.
No. 1.	62.87	0.01	Slightest trace
" 2.	62.60	0.008	Slight trace

Two analyses of other Galway ores made by Messrs. Heys and Rice gave:

	Metallic iron.	Phosphorus.	Sulphur.
No. 1.	65	0.04	0.02
" 2.	70.40	Trace	Trace

There is no Titanium in any of these ores

The railway freight to Toronto should not exceed 60 or 70 cents per ton, and the mining of these ores should not exceed \$1.50 per ton, so that the cost laid down in Toronto should be less than \$2.25 per ton, or much less than half what similar ores cost in Chicago.

Yet Chicago is one of the largest iron and steel manufacturing centres in the States, while not a ton is smelted in Toronto.

I can show samples of over 40 magnetites and about 25 hematites, all from different deposits in Canada, received within the last year, so that our country is remarkably rich in the extent and variety of its iron ores. All that is wanting is the enterprise to mine and ship them to market.

Yours, etc.,

T. D. LEDYARD.

The Coalfields of Cape Breton.

By E. Gilpin, Jr., F.G.S., F.R.S.C., Inspector of Mines.

(Continued from August issue)

Had the uplifted edges of the older rocks been straight, like a ruler, the coal-bearing strata would have dipped uniformly away from them, and remained parallel throughout the district. But nature abhors a straight line, devoid of beauty save to the mathematician. Owing to underlying spurs of the older strata projecting beneath the coal measures the uplifting of the former produced transverse subordinate tilting in addition to the general or continental inclination to the east. The effect of this has been to throw the seams into a series of curves, having the ocean as a secant. Taking the coal seams of the Sydney district as they are met at Cape Dauphin they are seen ridged up against the Syenite of the Cape, then lessening in the steepness of their dip they range across the Big and Little Bras d'Or to Sydney Harbor, where their inclination is about four degrees. As they cross the harbor they turn more to the north-east, and dip steeply until they turn again with the regular dip and run into the sea at Lingan. Emerging again they stretch in a regular curve for miles across Glace Bay Brook and Basin, and turning again toward the north-east with increasing dips enter the sea at the north head of Cow Bay. Hitherto the transverse subordinate foldings have not been marked enough to interrupt the continuity of the strata enclosing the coal beds, but here the upward movement has brought lower rocks to the surface, and there is an interval of rocks which do not hold coal seams.

In Cow Bay the same forces have formed another basin, called a synclinal, the seams dipping down on the Long Beach side and up again on the Gowrie side. But the axis or general inclination of the trough is still to the eastward.

Finally, the seams of the Cow Bay district, after crossing the narrow strip of land forming the north side of Mira Bay, pass under the Atlantic and are lost beyond the three mile limit.

Speculation as to the original extent of this coal field is profitless, if interesting. But we do know that, reasoning from a fair basis of facts, we have now but a remnant of the great coal field of the Gulf of St. Lawrence. When we consider the fringes of coal fields, and of carboniferous strata which occur around Cape Breton, on the west side of Newfoundland, in the Magdalen Islands, and along the northern shores of Nova Scotia and New Brunswick, we can scarcely realize that over that great gulf the forests of the Carboniferous once spread, amid the voiceless and sullen lagoons of the mysterious country.

Owing to sudden pressure or other causes, the movements of the coal-bearing strata are sometimes accompanied by breaks or faults. Often great blocks of strata, miles in extent, thousands of feet in depth, and weighing myriads of tons, have been raised out of the continuity of the coal field, so that the miner suddenly finds in front of him a wall of stone. His coal bed has vanished, cut off by the irresistible force of the great lever which is continually raising and depressing continents. Much trouble is often experienced in finding the lost bed of coal, which is sometimes moved many feet away. In the Cape Breton coal field the faults are few and of little moment,—a fact which not only reduces the risk and expense of mining, but encourages the capitalist and engineer in starting new pits. There are few coal fields of which it can be said, as in Cape

Breton, that any seam can be located at any point inside the boundaries of the coal district with a margin of error not exceeding a few feet.

The question has often been asked me, "are the seams of the Cow Bay, Sydney, and Glace Bay districts distinct, or are they the same seams interrupted by the sea as the flexures of the strata approach and leave the shore. The answer is that they are the same seams although somewhat changed in character and size as they range over some twenty-five miles of country. The seams are identified by the thickness of the masses of intervening strata, some peculiarity of roof or floor, etc., etc. The Geological Survey have tabulated the seams of the different districts, and as their conclusions do not appear to coincide with the opinions of any of the critics, it may be assumed that they are pretty near the mark. The question, however, is one of geological rather than of economic interest, as the coal seams all vary slightly in their quality at intervals of a few miles.

Coal.

Having outlined the distribution of the Carboniferous of Cape Breton as laid down on the excellent maps of Mr. Fletcher's reports to the Geological Survey, the next task is the consideration of the minerals characterizing it. The principle minerals are coal, gypsum, limestone, and iron ore. As the first named is the most important, I venture to dedicate this paper to its consideration, and propose to describe the remaining minerals, together with those found in the other geological horizons, at a future time. This will prove more convenient for reference, as several of them, notably the iron ores, are common to several ages. In this Island coal beds are found most abundantly in the productive measures, but there are important deposits in the millstone grit. There are also beds of coal in measures referable possibly to the upper coal measures, and in the Richmond district coal occurs apparently in conjunction with the marine limestone measures. Examples are not wanting in other countries of valuable deposits of coal in these divisions of the Carboniferous, but so far as our information goes we are not warranted in looking to them as important sources of this mineral in Cape Breton.

I have already alluded to the fact that it is difficult to draw with distinctness the line separating the productive from the millstone grit measures, and will therefore consider the coals without regard to their geological position, a factor little affecting their composition.

Speaking in general terms, the Cape Breton coals are bituminous and coking. Many of the seams yield large volumes of gas of good quality, provided that a reasonable care be exercised in screening and picking. For domestic purposes they have proved acceptable wherever offered, as they kindle readily and leave little ash. For house use public opinion has selected the Sydney mines' main seam as the typical coal of the Eastern district.

These coals have been largely used for marine and railway steam raising, and compare favorably with any foreign competitors. They may be ranked between the best Welsh and the best Newcastle steam coals, judging from analyses and the reports of practical tests on English and French men-of-war. The tests recorded appear to prove the contention that the evaporative power of a coal is in proportion to the total amount of carbon contained in it, and that the greater the gas value the less the amount of water it is capable of evaporating. It is to be regretted that a series of rigid tests

of the coals now worked could not be made by an impartial authority, as they would undoubtedly show that with proper handling their evaporative powers are surpassed by few coals now used for marine boilers.

For coke-making these coals are well adapted, as they yield, from practical tests, a fuel excellently suited for iron and copper smelting. The adoption of any cheap form of washing would free the coal from the admixed stone and pyrites, and present a coke superior to that of Durham and Connellsville.

In presenting the following set of analyses of Coals of the eastern district I have followed the tabulation of the Geological Survey, altho' it differs from that of several writers, and have not attempted the correlation of the Gardner, Carrol, and other seams found underlying those at present being worked.

Pursuant to this arrangement the Hub and Crandal seams are grouped together. Next in descending order comes the seam known locally as the Block House, Harbor, Victoria and the Sydney Mines worked by the Block House, Glace Bay, Victoria, and Sydney Collieries. Below this comes the most extensively worked seam of the district known as McAuley, Phelan, and Lingan and worked by the Gowrie, Ontario, Caledonia, Reserve, Bridgeport and Lingan mines. The next seam to be noticed is that known as the South Head, Ross and Collins. Below this comes the Gardner, Tracey, Carrol and other seams to be again referred to.

The Hub seam is not now worked. Altho' its land area is limited, it has an extensive submarine development. It was well adapted for gas making, and yielded 9,500 cubic feet of 15 candle gas per ton. The following analysis will serve to show its character.*

Volatile matter.....	33.21
Fixed Carbon	63.94
Ash.	2.85
100 00	

The following table shows the composition of the second seam :

	Block House.	Harbor.	†Inter-national.	Victoria.	Sydney.
Moisture.....	.60	.80	.87	.75	1.26
Vol. Comb. matter, slow coking....	29.48	27.85	35.41	26.85	33.84
" " " fast " ..	31.58	29.40		32.13	35.51
Fixed Carbon, slow coking.....	65.56	67.05	58.56	68.13	60.78
" " " fast " ..	63.46	65.50		62.85	59.11
Ash	4.35	4.50	5.16	4.27	4.11
Sulphur	2.63	2.32	trace.	.....	1.70
Specific gravity.....	1.29	1.29	.....	.....	1.31

*Analyst unknown.

Unless otherwise specified, the analyses in this paper are by the writer.

†Analyst Professor Chapman.

The coals referred to above are generally laminated with a pitchy lustre, and carry a good deal of mineral charcoal on the deposition planes. The primary planes cut those out of deposition at high angles, but the secondary planes are not so regular. The primary planes usually hold films of carbonate of lime and iron, which is less frequently present in the secondary planes.

The gas values vary from 8,200 feet of 8-candle power at the Sydney Mines to 10,000 feet of 16.5-candle power at the Block House workings. The gas values of the seam apparently increasing towards the south, while the northern openings produce, as at the Victoria and Sydney mines, an article better adapted for steam and domestic purposes.

As few ultimate analyses have been made of Cape Breton coals, the following of the Block House seam made for the Admiralty (analyst unknown) is of interest:

Carbon.....	82.60
Hydrogen.....	4.79
Nitrogen.....	1.20
Oxygen.....	4.10
Sulphur.....	2.51
Ash.....	4.80

The following is the result of a trial of the Sydney coal made by the American Government in 1844, and, so far as the writer is aware, it is the only practical test ever made of the evaporative power of any Cape Breton coal:

Moisture.....	3.13
Volatile combustible matter....	23.81
Fixed carbon.....	67.57
Ash.....	5.49

Lbs. of steam to one of coal from
212°..... 7.90

Ash and clinker—per cent.... 6.00

*Theoretical evaporative power 9.25

The following table shows the composition of the ashes of the above coals:

Block House. Harbor. Victoria. Sydney.†

Iron peroxide..	45.621	63.355	56.543	51.33
Alumina.....	3.250	8.280	6.456	4.84
Insoluble silicious residue..	35.110	21.872	27.500	29.57
Manganese.....	.....	1.930	.....	.....
Magnesia.....	1.100	.....	.035	.23
Lime.....	5.425	4.640	2.598	3.05
Sulphate of lime.....	.....	.....	10.98	.....
Sulphuric acid..	6.750	2.126	3.790	.....
Phosphoric acid..	1.960	.514	.691	trace.
Alkalies.....	trace.	.....	.150	trace.
Chlorine.....	.....	trace.	.....	trace.

99.156 100.787 99.693 100.00

The coal of the third seam to be noticed as worked at the Gowrie Colliery is black with a grayish tinge. On fresh surfaces the lustre is bright and pitchy, with very fine laminae of jet-like coal, and a good deal of mineral charcoal on the deposition planes. This coal sometimes exhibits four cleavage planes, sometimes holding films of calc spar. Coal tolerably compact, with nearly black powder and little visible pyrites. This description answers for it throughout the district, except at the Reserve and Bridgeport mines it is more pitchy and lustrous.

(To be continued)

*From Regnault's formula.

†Analyst, H. How.

‡In this and following analyses alkalies are estimated only when in quantity.



SEALED TENDERS, addressed to the undersigned, and endorsed "Tender for Penetanguishene Works," will be received at this office until FRIDAY, 19th October next, for the construction of work at Penetanguishene, Ontario, in accordance with a plan and specification to be seen at the Department of Public Works, Ottawa, and on application to H. H. Thompson, Esq., Mayor of Penetanguishene.

Tenders will not be considered unless made on the form supplied and signed with the actual signatures of tenderers.

An accepted bank cheque, payable to the order of the Minister of Public Works, equal to five per cent. of amount of tender, must accompany each tender. This cheque will be forfeited if the party decline the contract, or fail to complete the work contracted for, and will be returned in case of non-acceptance of tender.

The Department does not bind itself to accept the lowest or any tender.

By order,

A. GOBEIL,
Secretary.

Department of Public Works,
Ottawa, 13th Sept., 1888.



SEALED TENDERS, addressed to the undersigned, and endorsed "Tenders for Post Office at Brampton, Ont.," will be received at this office until Tuesday, 9th October, for the several works required in the erection of Post Office at Brampton, Ont.

Specifications can be seen at the Department of Public Works, Ottawa, and at the office of Messrs. Beynon & Manning, Brampton, on and after Tuesday, 18th September, and tenders will not be considered unless made on the form supplied and signed with actual signatures of tenderers.

An accepted bank cheque, payable to the order of the Minister of Public Works, equal to five per cent. of amount of tender, must accompany each tender. This cheque will be forfeited if the party decline the contract, or fail to complete the work contracted for, and will be returned in case of non-acceptance of tender.

The Department does not bind itself to accept the lowest or any tender.

By order,

A. GOBEIL,
Secretary.

Department of Public Works,
Ottawa, Sept. 15th, 1888.

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1st.—Lot 28, in the 6th range, containing 100 acres, in addition to the salina of the lake.

2nd.—North half of lot 23, in the 5th range, containing 100 acres.

3rd.—Nine acres of lot No. 28, in the 5th range, with water privileges thereto appertaining, being site of mill dam, etc., etc.

The property formerly belonged to the Montreal Plumbago Mining Company, and was worked successfully for several years, until the company's mill was destroyed by fire, but the mill dam remains almost uninjured, and there are on the property several houses, sheds, etc., built for various purposes when mining operations were carried out.

The Plumbago Deposits

upon the property are regarded as amongst the richest and most extensive in the Dominion. As to the quality of the Plumbago, it has been extensively used in the manufacture of crucibles, lubricating leads, stove polish, etc., etc., and given unbounded satisfaction. This is established by the experience of consumers, and by a certificate from the celebrated Battersea Crucible Works, London, England, a copy of which is open for inspection.

MICA

has also been discovered in quantities.

The lands are in the Phosphate region, and recent prospecting has disclosed a rich and extensive deposit of this mineral. There are unrivalled facilities for transporting the ore to and from the mines by the Ottawa River and C. P. Railway. Distance from mines to Railway Station 6 miles. Good road.

All that is required to make these valuable mines handsomely remunerative is a little capital and enterprise.

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OTTAWA.





Mining Regulations

TO GOVERN THE DISPOSAL OF

Mineral Lands other than Coal Lands, 1886.

THESE REGULATIONS shall be applicable to all Dominion Lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, iron or other mineral deposits of economic value, with the exception of coal.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein, either by surface or subterranean prospecting for mineral deposits, with a view to obtaining under the Regulations a mining location for the same but no mining location or mining claim shall be granted until the discovery of the vein, lode or deposit of mineral or metal within the limits of the location or claim.

QUARTZ MINING.

A location for mining, except for iron on veins, lodes or ledges of quartz or other rock in place, shall not exceed forty acres in area. Its length shall not be more than three times its breadth and its surface boundary shall be four straight lines, the opposite sides of which shall be parallel, except where prior locations would prevent, in which case it may be of such a shape as may be approved of by the Superintendent of Mining.

Any person having discovered a mineral deposit may obtain a mining location therefor, in the manner set forth in the Regulations which provides for the character of the survey and the marks necessary to designate the location on the ground.

When the location has been marked conformably to the requirements of the Regulations, the claimant shall within sixty days thereafter, file with the local agent in the Dominion Land Office for the district in which the location is situated, a declaration or oath setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as aforesaid; and shall, along with such declaration, pay to the said agent an entry fee of FIVE DOLLARS. The agent's receipt for such fee will be the claimant's authority to enter into possession of the location applied for.

At any time before the expiration of FIVE years from the date of his obtaining the agent's receipt it shall be open to the claimant to purchase the location on filing with the local agent proof that he has expended not less than FIVE HUNDRED DOLLARS in actual mining operations on the same; but the claimant is required, before the expiration of each of the five years, to prove that he has performed not less than ONE HUNDRED DOLLARS' worth of labor during the year in the actual development of his claim, and at the same time obtain a renewal of his location receipt, for which he is required to pay a fee of FIVE DOLLARS.

The price to be paid for a mining location shall be at the rate of FIVE DOLLARS PER ACRE, cash, and the sum of FIFTY DOLLARS extra for the survey of the same.

No more than one mining location shall be granted to any individual claimant upon the same lode or vein.

IRON.

The Minister of the Interior may grant a location for the mining of iron, not exceeding 160 acres in area which shall be bounded by north and south and east and west lines astronomically, and its breadth shall equal its length. Provided that should any person making an application purporting to be for the purpose of

mining iron thus obtain, whether in good faith or fraudulently, possession of a valuable mineral deposit other than iron, his right in such deposit shall be restricted to the area prescribed by the Regulations for other minerals, and the rest of the location shall revert to the Crown for such disposition as the Minister may direct.

The regulations also provide for the manner in which land may be acquired for milling purposes, reduction works or other works incidental to mining operations.

Locations taken up prior to this date may, until the 1st of August, 1886, be re-marked and re-entered in conformity with the Regulations without payment of new fees in cases where no existing interests would thereby be prejudicially affected.

PLACER MINING.

The Regulations laid down in respect to quartz mining shall be applicable to placer mining as far as they relate to entries, entry fees, assignments, marking of localities, agents' receipts, and generally where they can be applied.

The nature and size of placer mining claims are provided for in the Regulations, including bar, dry, bench, creek or hill diggings, and the RIGHTS AND DUTIES OF MINERS are fully set forth.

The Regulations apply also to

BED-ROCK FLUMES, DRAINAGE OF MINES AND DITCHES.

The GENERAL PROVISIONS of the Regulations include the interpretation of expressions used therein; how disputes shall be heard and adjudicated upon; under what circumstances miners shall be entitled to absent themselves from their locations or diggings, etc., etc.

THE SCHEDULE OF MINING REGULATIONS

Contains the forms to be observed in the drawing up of all documents such as:— "Application and affidavit of discoverer of quartz mine." "Receipt for fee paid by applicant for mining location." "Receipt for fee on extension of time for purchase of a mining location." "Patent of a mining location." "Certificate of the assignment of a mining location." "Application for grant for placer mining and affidavit of applicant." "Grant for placer mining." "Certificate of the assignment of a placer mining claim." "Grant to a bed rock flume company." "Grant for drainage." "Grant of right to divert water and construct ditches."

Since the publication, in 1884, of the Mining Regulations to govern the disposal of Dominion Mineral Lands the same have been carefully and thoroughly revised with a view to ensure ample protection to the public interests, and at the same time to encourage the prospector and miner in order that the mineral resources may be made valuable by development.

COPIES OF THE REGULATIONS MAY BE OBTAINED UPON APPLICATION TO THE DEPARTMENT OF THE INTERIOR.

A. M. BURGESS,

Deputy Minister of the Interior.

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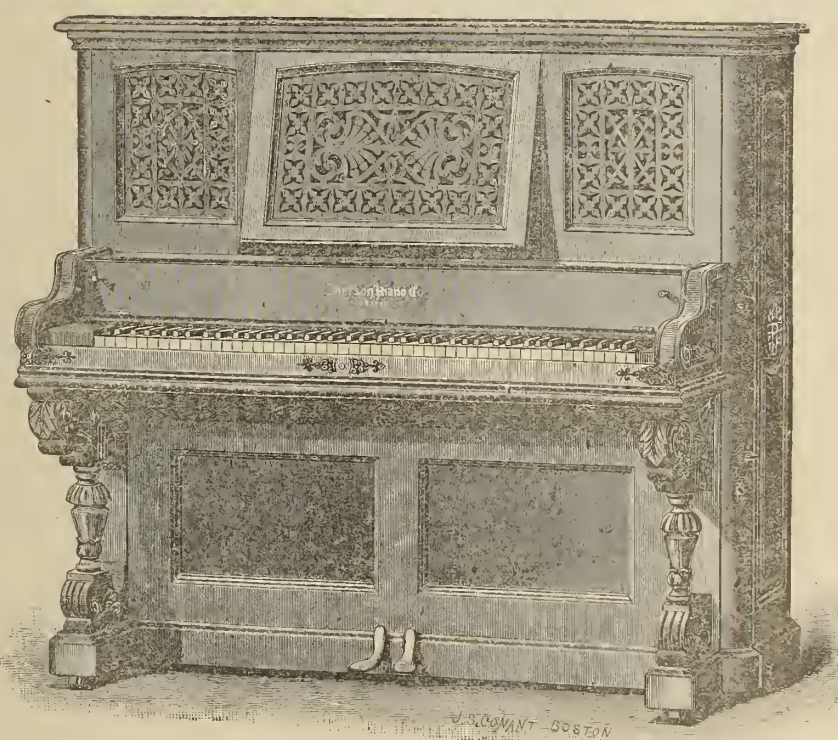
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What every Farmer should Read.

The introduction of commercial fertilizers marks a new epoch in the history of agriculture. Their general acceptance in common farm practice is equivalent to a new force. They have revolutionized the mode of agriculture as thoroughly as steam and electricity has revolutionized transportation and commerce. A barren soil can be changed into one of exceptional productiveness through the judicious application of those elements of Plant Food which are wanting in it. Fields not only can be brought to their maximum producing power, but what is more still, they can be kept there, so that year after year abundant harvests may be removed from them; for, thanks to commercial fertilizers, what is withdrawn by one crop from the soil can now be replaced into it before the rising of the next, thus ensuring the conditions on the existence of which remunerative harvests depend. Acres which the plough had abandoned in hopeless despair have been again added to the area, on the products of which nations live and thrive and prosper. The tiller of the soil who, fifty years ago, earned by the sweat of his brow a scanty subsistence for himself and his family, returns to prosperity, if not to wealth. The self-same acres which hardly supplied food and raiment for the peasant proprietor and his children, now furnish him the means of educating his offspring, of purchasing improved agricultural implements, of adorning his home, of living in comfort at his fireside, and of laying aside, by thrifty management, a penny for rainy days. The marvellous ease and rapidity with which France paid off the enormous war indemnity of five millions of francs has justly taken the world by surprise. Yet, in a large measure, it was due only to the wealth which the sons of France knew how to derive from the land they live on, by a generous and intelligent method of farming. Nearly all European countries show a marked increase in the fertility of land worn out by centuries of cultivation, and often poor by nature.

To what else can this be ascribed, if not to a practical recognition of the value of artificial manures?

The importation of guano into Great Britain has increased from 2,881 tons in 1841, to 152,961 tons in 1861, while contemporaneous with it, grew up an enormous demand for superphosphates and other fertilizers, reaching an annual aggregate of 250,000 tons. These figures should convince the most skeptical mind that the phenomenal growth of this industry was caused by a no less phenomenal, though perfectly legitimate, demand on the part of the cultivators of the soil for its products.

In the United States the development of the fertilizer industry began at a later date than in Europe. The almost unlimited extent of territory in the North and North-West enable this country to draw resources which were not open to the densely populated countries of the Old World. Besides, the vast stretch of land brought for the first time under the ploughshare, was then possessed of almost boundless fertility, and gave at first enormous returns. Rich soil

placed there by nature, yielded very remunerative crops, and the necessity of parting with a policy of waste, incident to every new country, and of adopting one of strict economy in its stead, was not felt for some time. These and other reasons retarded somewhat the progress of scientific agriculture in this country. Nevertheless, the laws of demand and supply, with regard to the soil, apply here with the same inexorable force as everywhere else, and thus the day arrived when the New England States found themselves compelled to abandon the primitive ways of agriculture, which had exhausted the land for well-nigh two centuries, and to resort to a more rational, more intelligent, more scientific method of raising crops. Appropriating the accumulated experience of the European countries, the use of commercial fertilizers was there inaugurated, and soon spread over all States on the Atlantic seaboard, so that the consumption in 1875 has been estimated at over 100,000 tons of superphosphates alone. Since then rapid strides onward have been made; yet, as will be seen, much remains still to be done in that direction.

As far back as 1797 a recommendation of President Washington emphasizes the position which agriculture in this country occupied, in his estimate, in the following words: 'That the encouragement of agriculture is an object highly worthy of public attention, as it constitutes the most useful employment of our citizens, is the basis of manufactures and commerce, and is the richest source of national wealth and prosperity.' Again: 'On a view of the state of agriculture in the United States, it will be found that though it has made considerable progress in some parts, yet there are many important principles and valuable improvements, known and practised in other countries, to which most of the American farmers and planters are utter strangers. It may also with propriety be remarked, that the science of agriculture is in its infancy, and is susceptible of much greater improvement than it has yet received in any country. To introduce into our own the improvements of other countries, and to lay the foundation for discoveries which shall essentially contribute to the happiness of mankind, is an object worthy the attention of the legislature of a free people.'

Here is clearly expressed, with a strange foresight into the future, that the United States is, above all, an agricultural country, whose main resources lie in the broad acres scattered with such liberal profusion over the length and breadth of the land. The mineral wealth, great as it is, loses much of its significance when held up against the wealth for which no laborious and expensive digging down into the very bowels of the earth is required, but which can be gathered in profusion right on the surface.

It will thus be seen that abundant and remunerative crops are beyond question the main source of wealth and prosperity. They are the means of bringing the money of all nations into the country, to be reinvested in manufacture, in commerce, and in whatsoever promises a profitable employment for capital. A prosperous condition of agriculture is the condition without which no prosperity in manufacturing industries can last. What the harvest sucks from the willing bosom of mother-earth, *that*, and nothing else, constitutes in all countries, and at all times, the most solid, the most reliable, and the most unfailling, because the only true source of a nation's welfare and advance. However, it is not enough to give merely mental assent to the correctness of this universally recognized axiom; it is necessary to go further and to carry out

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in practice the injunctions which flow from it. From what has been said, the paramount importance of the maintenance of the fertility of the farming lands is evident. A rough glance at the marvellous increase in the production and exportation of cereals seems to convey the idea that a corresponding increase in the producing capacity of soil has taken place. But this is not the case. On the contrary, the area on which crops are being raised has been increased; but, speaking in general, the productiveness of the land has decreased. That the fertility of the soil, over large and productive areas of this country, has suffered appreciable diminution within the past decade, there can be little doubt. Carefully compiled statistics prove that the soils of the New England States, though they have been under cultivation for well nigh two hundred years, and though they were surpassed in natural productiveness by the rich virgin soils of the West, and showing an increased percentage of returns, while the latter become from year to year less productive. Now, it is very important to learn why this is so; and the plain reason is simply that a reckless way of farming is practised in the Western States; while the New England States, profiting by the lessons of European countries, have struck out upon a new method of farming, and take great pains to put into the ground the requisite amount of plant-food for each crop.

Nevertheless, there are not a few who believe that the farmers would be better off without commercial fertilizers than they are with them. To this opinion no stronger evidence to the contrary can be adduced than the fact that the most intelligent farmers began to use them in the first place, and have ever since continued to use them. And the supposition is perfectly preposterous and untenable that any farmer, with but a grain of common sense, will continue to use what proves to him not a source of profit but a source of loss. As it is possible to own treasures, and to waste them, nay, to throw them away, so it is not only possible, but, in individual instances, sometimes, no doubt true, that no benefit may accrue to a farmer from manufactured fertilizers. But, on investigation, it will always appear that the fault must be found with something else than with what he used. Commercial fertilizers do not pretend to be an absolute, an infallible guarantee for a remunerative harvest—an error which is not unfrequently entertained; for the preparation of the ground, the time of their application, the quantity in which they are applied, the season, whether wet or dry, propitious or unpropitious, and a variety of other causes, may neutralize the beneficial effects the elements of plant-food would not have failed to exert under more favourable circumstances. Commercial fertilizers possess only this value, that, judiciously applied, they make large and paying harvests possible, where these without them would be impossible. Their unquestioned merit consists in this, that they enable the farmer to derive profits from lands, even, which without them promise no return for the labour entailed by cultivation. And, as a matter of fact not unworthy of record, the cotton-growing region has been extended by their use fifty miles beyond the limit where it was considered possible to raise that staple. The negative testimony of many failures has therefore no weight when science, supported by the experience of European countries and by an overwhelming majority of intelligent, practical farmers, bears witness to the efficacy of, and the beneficial results derived from commercial fertilizers.

The trade in this indispensable necessity has demonstrated its right to exist, and it deserves fully the recognition which lately begins to be accorded to it. In every direction its work and influence have proved highly advantageous. Of offensive and dangerous matters it made willing servants for the common good; valueless articles acquired a value, and were added to the list of commercial commodities. Wherever the products of the trade obtained, large returns put money into the farmers' pocket, enriching not only the land, but, through it, the owner likewise.

It is, therefore, no exaggeration to say that the agriculture of the future depends upon the growth and development of the fertilizer trade. For it depends upon supplies of plant-food brought from sources outside the farm, and prepared for the farmers' use by those who make it their business to do so, and who must, in order to succeed, bring to it not only a large capital, but likewise science as a handmaid, skill, and business talent as absolute requisites. The progress of this industry measures the true progress of this country, and promises results which it is impossible to foresee at this day. It opens up a wide vista of changes and improvements. It heralds the awakening of agricultural thought, and has partly awakened it. And with thinking comes improvement, comes better tillage of the soil, comes better stock, comes larger crops, better profits, and lastly, a higher moral and intellectual standard.

The practical question to which each farmer or planter must frame his own answer may be summed up as follows: Whosoever enters upon the cultivation of land opens, as a matter of fact, an account with the ground he undertakes to till, as with a bank. When he takes possession of fields, either by purchase or inheritance or exchange, the ground contains certain deposits of phosphoric acid, of potash, or nitrogen, etc. The raising of every crop is practically making a draft upon these deposits. As banks do not honor drafts if the amount of credit does not equal the amount of the draft, so the ground is unable to honor the drafts unless the deposits enable it to do so. The more liberal the deposits made in bank, the greater the balance to the credit. So with fields. The more generous the supply of plant-food deposits, the greater can drafts be made in the way of expected harvests. Let no one suppose that Nature refuses to honor drafts. Nature knows not of stinginess: but it obeys simply the universal law, that it is necessary to have in order to be able to give, and that it is necessary to receive in order to be able to return. Nature is generous. Improve the land by fertilization, and the value returned by Nature invariably surpasses the value of the outlay to make the ground fertile.

A Penny Saved is a Penny Earned.—To incorporate daily a certain amount of fine ground phosphate of lime into the fresh barnyard manure by scattering it over the manure pile, or to compost them for some months previous to their designed application, is a universally indorsed practice. The good economy of applying these phosphates in a finely divided state to the compost heap has been illustrated again quite recently by Professor H. C. White of Georgia.

The compost heap was prepared of 40 parts of earth, 34 parts of fine ground phosphate and 31 parts of cotton-seed meal, and the mixture kept moist with water.

The compound was made in June, and tested

in February. A careful estimation proved that one-third of the phosphoric acid had been rendered soluble in soil water, the commercial value of the phosphoric acid had been increased not less than 46.4 per cent.

It is quite safe to assume that fine-ground Canadian phosphate of lime treated in a similar way with fresh horse manure or turf, and kept moist with urinary excretions, would have given even still higher pecuniary results.

Yet, with these facts before them, some farmers not educated, purchase superphosphates with the soluble phosphates, valued at 8 cents per pound by the experiment stations, when the insoluble phosphates by the same authorities are valued at 2 cents a pound, a difference of 400 per cent. which the farmer can save at the expense of a little time, and a very small amount of labour. A penny saved is a penny earned. A word to the wise is sufficient.

Home Use of Phosphate.

The feeling is growing on every hand that it is absurd to be exporting this richest of all fertilizers while our country is full of worn-out lands. Farms are constantly being abandoned in Ontario and Quebec, and families emigrate to a life of hardship in a western wilderness for the sake of newer soils, when knowledge of the means of enriching the old lands would preserve their homes in affluence. It is not a lack of the existence of knowledge either that is at fault, for the knowledge has been gained and many communities are profiting by it, but the fault lies in lack of zeal on the part of those who should be the people's instructors, and also in lack of enterprise by commercial men who might spread the education to their own profit. Now that experimental farms are being undertaken in Canada, it is to be hoped that no niggardly policy will prevent the widest distribution of information as to the results obtained. No subsidy or protective tariff can compare for a moment, as a means of benefiting the country, with a system that would promote the production from its lands. An increase in the fertility of the soil would add to the wealth of the country more than any conceivable number of manufacturing industries could do, and this result would be secured without robbery or injustice to any unprotected interest.

Georgia has been admitted to possess the poorest soil of any of the Southern States, and twenty years ago its worn-out lands could be bought for \$3 per acre. But knowledge of fertilizing has been extended and these same lands now command a market value of \$30 per acre, and the State now leads the South in the quantity and quality of its farm products, its cotton equalling that produced on the famous Red River bottoms of Louisiana. The same improvement could occur in the Province of Quebec.

The agricultural editor of the Boston *Post* says: "To incorporate daily a certain amount of fine ground phosphate of lime into the fresh barnyard manure, by scattering it over the manure pile, or to compost them for some months previous to their designed applica-

tion is a universally endorsed practice. The good economy of applying these phosphates in a finely divided state to the compost heap has been illustrated again quite recently by Prof. H. C. White, of Georgia." This gentleman put finely ground Carolina phosphate into a compost heap and after about half a year "a careful estimation proved that one-third of the phosphoric acid had been rendered insoluble in soil water. The commercial value of the phosphoric acid had been increased not less than 46.4 per cent."

Many United States farmers now keep finely ground phosphate constantly on hand, and daily spread it in the stables and stalls to absorb the urinary excretions and become mixed with the manure. A most valuable fertilizer is thus secured at a small expense. Here is this natural fertilizer placed by nature at our doors, and we are not sufficiently intelligent or enterprising to make use of it. A great opportunity exists in this direction for both the philanthropist and the capitalist to work, and secure the blessing due to him "who makes two blades of grass grow where only one grew before." The Department of Agriculture and the Agricultural Societies should spread information about commercial fertilizers, and some wide-awake men should seize the opportunity to prepare and sell them in Canada.

This is a most important matter for our miners, as well as for our farmers, and we are fully justified in calling attention to it in these columns. Every pound of phosphate that can be mined in Canada is needed on her own soil, and should be sold here instead of being transported thousands of miles and often sacrificed in competition with inferior foreign products, or through losses by those "tricks of trade" that are so notable a feature of modern commerce.

Raw Phosphates.

Previous to the year 1770 it is difficult to find any record of the use of bones for agricultural purposes. In 1740 their value for a top-dressing for grass lands was accidentally discovered at Sheffield, where a heap of bone shavings, scrapings, &c., was buried in a field with marvellous results. The mechanical division of bones in their raw state was difficult, and so costly that it precluded their use in any other form than crushed. Liebig, some fifty years ago, found that by the application of sulphuric acid to bones it reduced them to a finer state of division than could be done by then known mechanical means. This application is often called dissolving bone in acid. There is no clear solution. It is a mere breaking up, it is a softening, pap-forming process, and bone in this state would more appropriately be called bone pap. The bone is merely so far reduced that, when rubbed between the thumb and finger, no grit is felt. Bone cannot all dissolve, for the sulphuric acid, when added rightly, unites with the lime of carbonate and phosphate, and forms with that insoluble sul-

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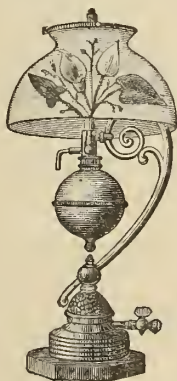
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phate of lime or plaster. It is this which gives the grayish-white look to the bone porridge. At the present time comparatively few bones are used for fertilizing purposes; phosphate rock, phosphorite, apatite and coprolites having been substituted generally in place of bones in manufactured superphosphates and commercial fertilizers. Where originally it was impossible to get raw bones ground fine by machinery, that difficulty does not exist with phosphate rock, phosphorite, apatite and coprolites, as they are all easily reduced to an impalpable powder at a low cost with the present machinery now in use, and it has been found by repeated experiments by competent authorities that if the phosphates are ground to an impalpable powder, they are as available to crops as if they had been treated with sulphuric acid, the carbonic acid of the soil and the soil water being as efficient a solvent as the sulphuric acid. In saying that phosphoric acid is insoluble it is meant that it is insoluble in pure or distilled water. Water which contains carbonic acid, ammonia, or common salt (and all water contains one or more of these), has the power of liberating the phosphoric acid from its base lime and rendering it available to roots. The action is slow, but it is sufficient, and it is more rapid the finer pulverization of the phosphate. In fact, phosphates treated with sulphuric acid, to render them insoluble before, but not after they are applied to the soil and sold under the name of superphosphate, when applied to the soil reverts or goes back to its original condition, this is generally admitted, but it is soluble in the acids of the soil in the same manner as are the phosphates ground to an impalpable powder. It is estimated that 400,000 tons of sulphuric acid, 50° strength, are used annually in the United States to convert insoluble phosphoric acid into soluble phosphoric acid, and that this quantity will be doubled during the next five years. As it requires about a ton of sulphuric acid of this strength for every ton of phosphate rock containing sixty per cent. of phosphate of lime, it is readily seen that the sulphuric acid will cost more than the phosphate of lime, and reducing the quantity of phosphoric acid in the resulting superphosphate one-half. Certainly this is a most costly way for the farmer to obtain the phosphate of lime, finely divided so that the acids of the soil can act upon it. The present machinery in use is by far the cheapest method, for in addition to the great cost of the sulphuric acid, and the necessary expenses attending its use, there comes the expenses of transportation, which has been doubled by the addition of the sulphuric acid. It is claimed by some that for tilled and quick growing crops (it is conceded that it will for grass and winter grains) the phosphoric acid will not be liberated as fast as the crops require it from the phosphate when in an impalpable powder; but there can be applied at the same cost four times the quantity of phosphoric acid in phosphate of lime in an impalpable powder, than there can be

in phosphate of lime treated with sulphuric acid, and there can be no question but that with using four times the quantity as much phosphoric acid, if not more, will be as available for the growing crops as if one-quarter part was used that had been treated with sulphuric acid; again, the additional three-quarters used is not lost, but becomes assimilated in the soil for the drafts of future crops upon it. But we are not confined to the use of sulphuric acid or the slower operations of nature to render the phosphoric acid in phosphate of lime immediately available for crops. It has long been known that fermenting manure or peat with phosphate of lime powder scattered or mixed through it would render the phosphoric acid at once available. This certainly is a better as well as a cheaper way for the farmer to procure soluble phosphoric acid, than to get it in phosphate of lime, treated with sulphuric acid at four times its first cost and the expenses for transportation doubled. The theory of scientific agriculture is based upon a complete knowledge of soils, plants, animals, and manures, and it is evident that until these elements are thoroughly understood, no attempts at improvement or plans for increased production can possibly be successful. The manure question is the most important one connected with agriculture or horticulture. With fine ground phosphates as the basis of operations, we can now obtain complete manures for any culture, made according to any formula, and containing in a readily assimilable form all the ingredients called for.

Ottawa as a Mining Centre.

It has been predicted that with the waste which for many years has been taking place in cutting and preparing timber in our forests, and from the want of any systematized forestry regulations, the time is not very far distant when the lumber trade of Ottawa will shrink into very small proportions from the want of material, and that the large and costly establishments now employing, in this vicinity, so much labour and capital will materially curtail their operations, and practically suspend work on a large scale. The question which naturally arises is, how will Ottawa be affected by such a result? The country surrounding the Capital is not an agricultural district compared with Western Ontario, and manufactures are only in their infancy. But just at the very time when this apparently bad outlook looms up, a new industry appears and is assuming such proportions that there is every reason to believe it will, before many years elapse, become the leading enterprise of central Canada, and afford employment for hundreds of busy hands. This industry is mining and utilizing the product of the mine. The whole country north of Ottawa, wherever the Laurentian range of mountains is met with, possesses mineral wealth of one kind or another. Iron, plumbago, galena or lead, phosphate or apatite, asbestos and mica, all are there, and in rich profusion. Few persons, beyond those engaged in

mining enterprises, are aware of the richness of this section, and the wealth that has been lying at our very doors for years past, waiting only the hand of man for development. It is of untold value. The plumbago mines at Buckingham, a few years ago, gave every promise of becoming one of the largest industries in Central Canada, but mismanagement and waste curtailed their operations, and the large crushing mill on Donaldson's Lake being destroyed in the great bush fires which swept that section of the country, crippled that industry for the time being. These works, however, are now to be utilized again, and the yield of the mineral is of so pure a quality and so easy of access that the only wonder is that they have not commenced operations before. The enormous proportions the phosphate industry has assumed are well known both in Europe and at home here, and United States capitalists are investing largely in phosphate lands and phosphate operations. Not only, as at first, is the mineral mined and shipped, but crushing and pulverizing works are now in operation, and a demand for ground phosphate has arisen amongst the fertilizer companies on the shores of Lake Erie, and elsewhere, which bids fair to shortly revolutionize the trade in rock phosphate by shipping only the ground material. Water power is the only cheap motor for works of this nature, and the mighty power of the Chaudiere Falls, which hitherto has been confined to the manufacture of forest products, will contribute its share to the development of mineral wealth as well. The iron deposits which abound in this vicinity will prove as valuable in the near future as the gold-bearing quartz in the lands where the latter is worked. The iron of this district is known abroad for its excellent qualities, comparing as it does with the finest Sheffield steel, and one mine alone, in the townships of Templeton and Hull, is estimated by Professor Chapman to contain 6,300,000 tons, equal to a daily output of 100 tons of ore, or 60 tons of metal, during a period of a century and a half.

The iron deposits in Bristol are also now a centre of attraction, a number of capitalists having taken them in hand, and the only requisite to perfect a large iron trade in our midst are smelting works, which time will certainly bring about. Taking into consideration these facts, he who reads the future will see visions of mining industries and their attendant factories supplanting the timber trade, when forest products will require to be handled miles away from their present location. As the demand for timber yearly drives the lumberman further and further up the head waters of the Ottawa and its tributaries, the mills will have to be located nearer to the place of production, and railway facilities for the transport of square timber and deals now penetrate the lumber district to such an extent, that the material loaded on the cars for Quebec now passes by Ottawa in transit, instead of as formerly being floated here as a distributing point, where it could be rafted or

sawn and shipped in its manufactured state. Where is the rafting that only a few years ago filled the bay below Parliament Hill with its industry? Where are the raftsmen whose stalwart forms filled Sussex street and Lower Town during the summer months? Gone with the advance of railways to other points which demand them. But the miner is gradually filling their place, and although his presence is not yet felt to any extent in the streets, yet we think the banks could tell us something of the large transactions done with him, and of the heavy drafts the pay roll of the mines requires monthly. The settlers on the Lievre and Gatineau who were virtually in the power of the large lumber firms, and who sold their produce to those firms for whatever they could get, are fast acquiring money from the demand the mines make for farm produce of all kinds; and this not for one firm only, but the competitive demand of the various mines enables the producer to ask and obtain a fair value for his hay, his roots, and produce generally. To the mining industries must Ottawa look in the near future for its trade, and although lumber has done much to build up the manufacturing industries of the Capital, mining will do still more, and be a permanent source of wealth when the pine tree will be as scarce in the Ottawa district as it now is in Western Ontario.

The Phosphate Trade of Canada.

Revised from Vol. V., No. 6, of THE CANADIAN MINING REVIEW.

There are probably very few persons beyond those interested in the industry who know what Apatite is, or to what uses it is applied, and when they are told that the shipments of crude rock in 1887 reached the large amount of 23,690 tons, of an estimated value of \$319,815, and that they are annually increasing, they will naturally seek some information respecting it. Apatite is the crystalline form of phosphate of lime, used largely for the manufacture of superphosphates when treated with sulphuric acid. It is only within the last few years that attention has been given to its existence in Canada, although the late Sir William Logan cites its existence in certain localities. Specimens of it, and very pretty they look in a cabinet, might have been seen in museums or in private collections, but the great wealth it would bring to the country was little thought of, and mining it on any large scale would, till quite recently, have been looked upon as a waste of money. To-day, however, it is taking its place as one of the foremost industries in Canadian mining, and with the exercise of care and judgment apatite mining affords a handsome return to those who engage in it. This industry, moreover, adds to the general wealth of the country, by the circulation of money in the purchase of agricultural products to feed the miners, for boats and railways transporting it to the seaboard for shipment, to the vessels which carry it across the Atlantic, and to the brokers and commission merchants who handle it before it reaches its British purchasers.

Prof. Boyd Dawkins, an eminent geologist, who, when in America with the British Association, visited the Ottawa County mines, stated in a paper read by him at Manchester, on his

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return, that in his opinion phosphate was "one of the most important resources of Canada."

When Liebig, in the year 1840, compelled the agricultural community to accept his views of exhaustion and restoration of the soil, and that the constant removal therefrom in the harvest of the inorganic elements of plant food, notwithstanding the rotation of crops and the old system of manuring, was a robbery of the soil, which enriched the present at the expense of the future, he may be said to have been the founder of an industry which has assumed constantly increasing proportions ever since. That industry is the manufacture of fertilizers or superphosphates, and the demand for materials from which these can be manufactured led to a search for, and consequent working of, natural deposits in which phosphate of lime preponderated. It is not our intention to go into the question of fertilizers further than to state *en passant* that in supplying the nutritive elements of plants in the form most favourable for absorption and assimilation, the whole art of manuring consists, and that as ordinary manure does not always contain the two most important inorganic elements of plant food, phosphoric acid and potash, sufficient for plant use, the needs of mankind demand the employment of artificial fertilizers along with or as a substitute for farm-yard manure.

Dr. Dawson, the assistant-director of the Geological Survey of Canada, in a paper read by him before the Ottawa Field Naturalists' Club, in 1884, reviewed very concisely how phosphorous was essential to all living tissues whether vegetable or animal, and in following the transmission of that substance from the soil to the plant, from the plant to the animal, and from the animal again to the soil, he further pointed out that this cycle of nature is interfered with and broken by the massing of population in large towns where the phosphates and other substances valuable to agriculture are lost. He also cited statistics of the amount of phosphorous actually contained in the grain annually shipped from the port of Montreal, estimating it for this purpose in the form of phosphoric acid. Wheat contains eight-tenths per cent. of this, or about sixteen pounds to the ton, and a very little calculation will show annually the enormous amount carried away, and a still further calculation, based on the average quantity (about two-tenths per cent.) contained in ordinary soils, gives the amount of phosphate of lime required to restore and maintain the fertility of the fields. With these statistics the necessity is evident of having sources of supply of phosphates, the most available of which are concentrated natural deposits. The questions that follow are: What is the nature of them? Where do they occur? How have they been formed?

To the first of these questions let us take Dr. Dawson's own words: "The concentration of phosphates in nature is generally found to have been brought about by organic agency," and he then cites as the first example guanos, composed essentially of the excrements of seabirds. These are divided into two classes, nitrogenous and phosphatic. In the former, which belongs exceptionally to dry climates, the organic matter, converted by decomposition into ammonia salts, remains as part of the mass, but in the latter the rain has removed the soluble ammonia, leaving the phosphatic matter. This is the case with the West Indian guano, and the coral rock, penetrated with hollows and tissues, has become so permeated with phosphatic accumulations that it is known as phosphatic rock. The deposits in the South of France, known as

Bordeaux phosphates, are looked upon as of a similar origin, the higher parts, the plateaus of Jurassic limestone in which it is found appearing to have formed at one time an archipelago in a tertiary sea, like the West Indian Islands of our own time. This phosphate rock, however, is of very modern origin geologically speaking. Coprolite beds, such as the phosphate rock of South Carolina, have their origin in a different source, and are traceable to the accumulations in shallow tidal estuaries of ancient seas, of molluscs, bones and other marine organisms massed together by concretionary action, and forming layers similar to the well-known mussel beds on many parts of our sea coasts to-day. But the expression coprolite, applied as it is to Carolina phosphate, is erroneous. It should only be applied to the fossil excrements of various animals, notably the saurian monsters of the antediluvian shores, and which are so abundant in the eastern counties of England that coprolite pits have been worked there for many years. Crystalline phosphate or apatite is new, different in appearance from the preceding, and Dr. Dawson remarks, speaking of it, that in the Laurentian rocks of Canada are sediments deposited in the earliest seas of which we have any trace, but which originally resembling those of later seas, have been so completely altered that their materials have entered into new combinations, and have by igneous action become entirely crystalline, resembling now the original deposits as little as do the crude ingredients of glass the finished product. In substantiation of this theory limestones thus acted on would assume the crystalline character of marble, beds of a peaty or coaly nature would pass into graphite or plumbago (crystalline carbon), and phosphatic layers would appear as crystalline calcic phosphate or apatite. All these substances are found in contiguous zones or belts in the Laurentian rocks near Ottawa, an evidence pointing directly to the correctness of this theory. The greatly disturbed character of these rocks explains the irregularity of their deposits, as layers which, before the great folding and kneading together caused by igneous and volcanic disturbance may have possessed regularity and uniformity, have been so dislocated and upset as to lead to the production of large pockets and irregular masses, connected only by narrow and twisted seams, so narrow sometimes as to appear as isolated portions.

The principal sources of supply may be stated as follows:—The West Indies and other islands of the Caribbean Sea, supplying what is known to the trade as Sombreiro phosphate, or rock guano as it is sometimes called, of high quality; Navassa, from its impurities can only be used for a lower grade of superphosphate; Maracaibo, or Mark's Island, is of very high quality; St. Martin's Island, of good quality; Araba Island yields a variable quality, and Pedro Keys and other small islands yield an uncertain supply. In the Pacific Ocean, Baker, Jarvis, Howland, Malden and Starbuck islands afford a high-class rock guano. In the South of France the Ardennes region affords what is known as Bordeaux phosphate, so called from the port from whence it is chiefly shipped. The valley of Lahn, in Nassau, yields what is known as German phosphate. The eastern counties of England, Cambridgeshire, Bedfordshire and Suffolk, produce coprolite of high quality. Boulogne, in France, yields coprolite, used largely for mixing with materials of a higher grade. South Carolina, in the United States, produces large quantities of phosphate known

as Charleston rock, of a low grade, but very largely used, its composition being easily attacked by acid.

Crystalline phosphate of lime or apatite, the purest form which is at the manufacturer's disposal, is now becoming more and more sought after owing to its high percentage and greater purity, and Canada will, from present appearances, be the chief source of supply. Norway furnishes an excellent quality of this material, but the supply is limited. Spain produces large quantities of apatite, and in Extremadura and the neighbouring districts of Portugal large deposits have been known to exist for some years, but have only recently been worked to any extent. The above-mentioned places are the only known sources whence apatite is obtainable, and as a consequence the great value it assumes from its limited sources of supply must be at once apparent.

In his report on the County of Hastings, in the Province of Ontario, in 1871, Mr. Vennor, late of the Geological Survey staff, called attention to large deposits of apatite existing there that had been quarried on and off for over 20 years. The richest of these occur in the township of North Burgess, where a number of "openings" were worked with fair returns. These deposits he named respectively "the North Burgess Basin," and "Bedford, Storrington and Loughboro Basin." Analysis of specimens taken from these in different localities gave as an average 88 per cent. of phosphate of lime. The mineral has now been discovered more or less all through the district lying north of Kingston and Belleville, and although mining is now carried on there on scientific principles, it is as yet in its infancy as far as that part of the country is concerned.

The Laurentian Mountains of the Province of Quebec seem to offer greater advantages than elsewhere for this species of mining, especially in the district lying northeast of Ottawa and within a radius of 30 miles from the Capital. This Laurentian range meets the eye when ascending the river St. Lawrence from the sea, and runs parallel to it on the north shore, and diverging somewhat east of the confluence of the Ottawa River, follows the coast of the latter westward by north, sending a spur across it near Portage du Fort, which penetrates the Kingston district alluded to before. The natural formation of these mountains is far from being conducive to agriculture, the country presenting a succession of small isolated, rounded, rocky hills, alternating with numerous lake basins. The rocks, though concealed in the valleys by considerable depths of alluvial soil, are seen in the hills to be hard and undecayed. After the first growth, which covers these hills in a state of nature, has been cut, the undergrowth is apt to be destroyed by fire, and the comparatively thin layer of soil is laid bare, which, being soon washed away by the rains, exposes the rock and renders the region sterile. With the exception of straggling settlers here and there in the valleys, all this district had been left as valueless till the discovery of the presence of apatite brought it into notice, and land, which was held by the Crown at 30 cents an acre, was bought up by speculators, and realized fabulous prices for mining purposes. The latter is carried on principally in the townships of Buckingham, Templeton, Wakefield, Hull, Derry, Portland, and Bowman, the two former being the chief fields of present operations. Exploration shows that apatite is to be found in a much wider district than the above mentioned, the zone containing it running in a north-easterly direc-

tion from the Blanche River across the river Lievre into the adjoining country east, and then taking a curve backwards in a north-westerly course. The belt is very productive and yields a very fine quality of apatite.

Dr. Sterry Hunt, who has made a persistent study of the Laurentian rocks for upwards of thirty years, says the question of the continuity of the deposits is important. Veins fitting fissures in the rocks are sometimes continuous for great lengths and to great depths, but their extent varies. Inclined beds of the material, which once were horizontal sheets inclosed in strata that have since been folded or convoluted, should be as persistent in depth as in length and when traced in the outcrop for hundreds of feet may be expected to continue downwards as far, unless a turn of the enclosing strata brings them up again to the surface. He urges, therefore, deep mining for permanent success, and the experience of the past couple of years proves the correctness of his theory.

Up to 1886 the majority of the workings were superficial, consisting rather of shallow pits or large quarries. The reason for this is traceable to the fact that apatite in its crude state finds a ready sale at all times, even in small lots of five or ten tons. Consequently farmers and others opened pits and trenches for the purpose of extracting what mineral was within easy reach, and with satisfactory results, but so soon as the opening attained a depth at which work became difficult from the want of appliances for hoisting, or from the inflow of surface water, the pit was abandoned for a fresh outcrop close by, and the same process was repeated. The very abundance and value of the mineral thus led to its careless and wasteful handling, and retarded for some time its legitimate growth. With the advent of capital matters assumed a different aspect, and the old unbusinesslike system of mining which characterized the first attempts in the Ottawa district has been abandoned, and deep mining is now engaged in with great promise of abundant returns. The investment of foreign capital, and the organization of powerful companies composed of men of practical business ability and intelligence, together with the introduction of steam power and improved machinery, economy in the management of the mines and the necessity of shipping only a high grade of purity, have now placed these works on a sound and permanent basis. One American company has sunk a shaft on their property to a depth of over 600 feet, passing through several deposits of pure phosphate and following the connecting vein which narrowed at certain depths to no greater thickness than a man's thumb. At this depth they struck a productive deposit on which they have continued working, running drifts laterally, and turning out a large yield of apatite of high standard.

The great advantage the Buckingham mines possess is their contiguity to navigable waters, the mines in the majority of cases being situated near the River Lievres. This is a slow, sluggish stream, very deep and only at one point in its course (known as the Little Rapids) where boulders occur and a ledge of rocks crosses the channel, is any obstruction offered to navigation. This is at present obviated by the use of flat bottomed scows carrying the apatite, being towed to the head of the rapids by a small steamer, where they are let loose to float over it, much in the same way as cribs of timber are sent over the Ottawa "slides," or over the rapids of the Ottawa and St. Lawrence rivers. At the foot of the rapids the scows are taken in tow by another steamer which tows them to a landing



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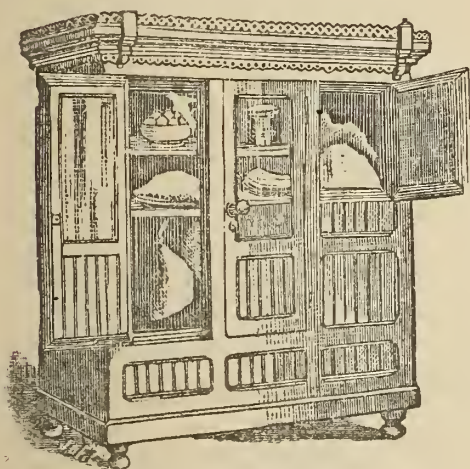
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at Buckingham Village, where a short branch line of the Canadian Pacific Railway has trucks waiting alongside the river, into which the mineral is transferred, and conveyed thence direct by rail to Montreal, where the cars on arrival, traversing the line of docks, run alongside the vessel which is to receive their contents. The Government, recognizing the rapid growth and increasing importance of the industry, has at present under construction a large Lock and Dam, which, when completed, will obviate this difficulty and greatly facilitate the transportation of the ore, at the same time enabling the miners to handle their output at a minimum. The cost of floating the mineral down the river ranges from 30 to 50 cents, according to distance, the freight by rail to Montreal costs about one dollar and twenty-five cents per ton. Ocean freight ranges from three shillings to seven and six pence sterling, although there are times when from want of freight vessels will carry the mineral as ballast free of charge. The value of the crude material in Liverpool ranges from eighteen to twenty dollars, and from these figures it is easy to see what a profit there is in prosecuting this industry. But it is only by the outlay of large capital in developing and getting operations into thorough working order that this end is attained. The first year seldom leaves any margin, owing to the heavy outlay for plant, buildings, etc. But in the case of two companies, at least, one English and the other American, it is known that after the first year's outlay a large dividend was declared and paid to the shareholders.

Care has to be taken that the quality shipped is of a proper standard, and not mixed grades. The qualities are known to the trade as firsts, seconds and thirds. The best quality averages from 80 to 88 per cent. of tribassic phosphate of lime, the general run of the apatite shipped ranging from 75 to 85 per cent. The present basis of value for 80 per cent. mineral is about 11d. per unit, with a rise of one-fifth of a penny for each additional unit. To secure an even grade, dressing is resorted to under the name of "cobbing." This is necessitated by the intrusion of mica, pyrites, pyroxene, and carbonate of lime, all useless materials which have to be got rid of, except where large masses of pure apatite have been brought to the surface. Cobbing consists of the separation by hammers and hand picking,—an easy operation owing to the softness of the apatite as compared with extraneous substances—in a building known as a cobbing house partly open at the sides. On one side of this, through or around the interior of which solid tables or stands are located, are empty tram-cars or waggons, into one of which the refuse is thrown as broken off, whilst the apatite thus cleared is thrown into another receptacle on the other side. Boys and old men are employed at this work, and they earn from 50 to 75 cents per day, being paid mostly by piece work. This process has been greatly facilitated by the recent introduction of revolving screens, jigs, and other improved machinery, now adopted by all the leading mines.

The various forms in which the apatite of the Ottawa district presents itself are in crystals, sometimes of very large dimensions, in masses varying from compact to coarse granular; in strata of a lamellar texture, and in a friable variety which is abundant, known as sugar phosphate. Phosphate crystals consist of six sided prisms with complete pyramidal terminations, though often possessing one pyramidal termination and one basal plane. In size they vary greatly, viz: from those of less than half of an inch in length and corresponding thickness,

weighing only a portion of an ounce, to those of many hundredweights. A large and almost perfectly formed crystal from the Little Rapids mine may be seen in the collection of the Geological Survey's Museum at Ottawa.



The usual color of crystals is green. Some, however, approach white, while others are of a pink, yellow or violet tint, and others nearly black. The color appears to be purely accidental and is due to various impurities mechanically mixed with the minerals. Thus the red and brown varieties contain minute crystals of hematite; the blue and green, scales of chlorite; and the yellow and blue owe their tints to organic substances.

Having now given an idea of what apatite is, and of the Ottawa district in which it is worked, it may be well to describe some of the larger mines in that locality. The Emerald Mine, one of the earliest opened, has been one of the most productive, and is worked on thoroughly scientific principles. It is situated some 9 miles from Buckingham Village, is owned by the Ottawa Phosphate Company, and has changed hands several times, each succeeding purchaser paying higher prices, the last sale clearing the owners over \$50,000, before any large works such as are now carried on there were undertaken. Drifts are now in the side of the hill to the main shaft, by means of which the refuse as well as the mineral are run out on tramways. The Little Rapids Mine is a very valuable property, some 3 miles north of the previous mine. A large number of openings have been made on the property, all of which have yielded very good returns. Several deep shafts, two of them extending to a depth of over 200 feet each, have been sunk and drifting carried on at various levels with great success. This mine is owned by Mr. W. A. Allan, of Ottawa. It is well equipped with the latest and most improved machinery. A well constructed tramline from the pit's mouth to the river landing was built last year. The North Star Mines, owned by an American company, contiguous to the previous mine, is yielding good returns for the outlay on them, and it is here that the deep shaft of 600 feet, previously mentioned, has been sunk. All the above mentioned mines lie on the eastern bank of the Lievres. Some 8 miles further up, on the left or western bank, are to be found the High Rock Mines. These are probably the most extensive of all, and belong to the Phosphate of Lime Company, of London, England, under the management of Mr. W. W. Pickford. The property owned by this company covers 1,200 acres. The profits of the three years, 1882-3-4, were sufficient to cover all the outlay and to admit of a dividend of 25 per cent. on the capital stock, besides setting apart \$10,000 as a reserve. The principal operations are conducted in their large No. 11 tunnel, and as an instance of the abundance of this mineral in the workings at this point, it may be said that no later than on the 11th of June last, 55 tons of high grade ore were taken out from one blast. At present the yield is richer than at any previous time since the mines were first operated. A large number of openings are also being worked on different portions of the property. The annual output from these richly productive mines may be fairly stated as at 7,000 tons per

annum. Tramways along the face of the mountain, on which these works are situated, carry the refuse to points where it is easily dumped into ravines and so away from the site of any probable future openings. The offices, and buildings for the miners' accommodation, are scrupulously looked after, and the company has provided a reading room well supplied with books, papers and periodicals for their employees' use when not working. The mountain is some 1,900 feet above the sea level, and the view is very fine, the Laurentian hills in all directions rising one above the other till lost in the blue haze of the distance, whilst at the foot of the mountain is a natural beaver meadow, fringed with trees, and nestling as it does amongst the mountains gives an air of quiet and repose in contrast to the busy scene of the works going on above it. The number of men employed by this company ranges from 100 to 150. The Canadian Company's Mines adjoin those owned by the High Rock people. This company was organized in London in the beginning of the present year, with a capital of 110,000 shares at £1 each, and now operates the property formerly worked by the Union Company of New York. The property includes some 1,285 acres, and embraces the Star Hill, Williams and Ruby mines. The latest machinery and the most modern appliances are used; many new buildings have been erected, including a large cobbing house, with revolving screens; and a wire rope tramway from the pit to the landing is at present under construction. The escarpment which forms the walls of this ravine shows the course of numerous veins of the mineral all trending eastward and running into the mountain, and the main works are carried on by literally quarrying the hill side, and cutting it away in solid masses. Three years ago on the site of the Canadian Company's mines there was nothing but rock and unbroken forest; to-day there are numerous dwellings, substantial offices and storerooms, tramways and good roads. The number of men employed here ranges from 100 to 125.

There are numerous other mines being worked all through the apatite district, especially in Templeton, where both Canadian and American capitalists are interested, and new mines are being opened. In the Templeton district may be mentioned the celebrated Blackburn Mine, the oldest and most productive in this section, the Templeton and Blanche River Company, the Canada Industrial Company, the Anglo-Canadian Company, and Mr. Jackson Rae's mines. Extensive operations are also carried on at the Otty Lake Mines, in Perth; by Mr. James Foxton and others at Sydenham; and also by Captain Boyd Smith and others in the Kingston district. The description given of the mines above mentioned, however, shows sufficiently the magnitude of the various enterprises.

The following table of shipments, for each calendar year respectively, from Montreal, of crude Canadian apatite to be used in the manufacture of superphosphate abroad, gives a fair idea of the yield of the mines of the Ottawa district, as the greater portion of it is derived from them, the Kingston district only furnishing a comparatively small yearly amount.

1880.....	7,500 tons.
1881.....	10,307 "
1882.....	15,556 "
1883.....	17,160 "
1884.....	20,461 "
1885.....	21,876 "
1886.....	19,345 "
1887.....	20,319 "

The question may naturally arise why such a

commodity should be sent abroad to be manufactured when apparently it could be treated here and shipped in a condition ready for use, thus adding to our own industries. The reason for this, however, becomes obvious when we ascertain that the pyrites, out of which the acid for dissolving the apatite is not found in quantities sufficient to supply works on any scale within any reasonable distance of the mines. The cost of transport of pyrites would probably exceed the freight of the crude mineral to Europe, where, from the numerous chemical works existing, acid can be purchased far cheaper than it could be made here. Again our Canadian apatite enters largely into competition with a lower grade phosphate from other quarters in the superphosphate works across the Atlantic. When a demand shall have arisen amongst our own farmers to compensate by the use of phosphatic fertilizers the soil for the loss it undergoes by the constant removal of crops, especially in districts where cattle raising is not largely carried on, superphosphate works may be started with a show of success, in spite of all difficulties. In his Report for 1883 the Minister of Agriculture remarks:—"experience goes to prove that for the production of cereals of every description as well as for the strengthening and renewal of worn-out lands, no available fertilizer is known that can produce such beneficial results as phosphate when subjected to a chemical process."

A curious feature in the apatite trade of Canada is that, although a very large amount of American capital is invested in our mines, almost the whole of their product finds its way to Great Britain, and that a large amount both of crude and manufactured phosphate is exported thence to the United States. There is every reason to believe that both these articles are Canadian produce reshipped, and the explanation given for this by Mr. Torrance, late of the Geological Survey staff, is that it is simply due to the conservatism of trade, as American dealers were in the habit of importing from Britain long before our Canadian deposits were worked, no efforts have since then been made to direct from here into fresh channels a trade which was commenced with the English market by men more familiar with that than with the American.

A wealthy American company commenced operations last year at the junction of the Lievres and Ottawa rivers for grinding and pulverizing crude phosphate, either for acid treatment or for use in the pulverized state. These works are capable of grinding 50 tons per day, and an idea of the fineness of the work done may be formed from the fact that the powder has to pass through an 80 mesh bolt and blowers for separating the mica, leaving only a phenomenal quantity of that worthless and troublesome ingredient. The company have made arrangements by which the ground article can be delivered at cities along the south shore of Lake Erie, where all they can manufacture has been contracted for at a rate of freight of \$1.40 per ton.

In conclusion, Canadians are an agricultural class of people. The essentials for starting Canada's growth are force and material. The climate affords the forces, light, warmth and water; the material, lime, potash, ammonia and phosphate are at its very doors; and with these there is no reason why it should not be one of the most productive countries of the world, if it only uses in a rational manner the means which nature has provided for it.

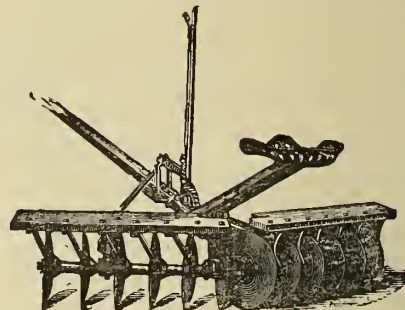
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Crude versus Acid Phosphate.

The use of mineral phosphate as manure began in consequence of the discovery by Liebig, in the year 1840, that sulphuric acid made it soluble. It is supposed that the effect of the acid upon the mineral is the same as extreme pulverization, and that in this minute form the particles become available for plant food. When the pulverized phosphate is mixed with about an equal weight of sulphuric acid it becomes soluble in water; but it is stated that all agricultural chemists now concede the fact that when soluble phosphoric acid comes into contact with the soil it immediately, or speedily, becomes insoluble. The authority of the eminent chemists Stillwell and Gladding, Thenard and Delaine, is given to support this point. If this is the case it would seem that the only reason for using the acid is that it may produce a finer sub-division of the particles than can be obtained by machinery, and when mills are secured that will effect extreme pulverization the use of the acid may be proved to be unnecessary. In the United States about \$5,000,000 worth of sulphuric acid is used every year in the manufacture of fertilizers. It is generally admitted that the acid of itself possesses no productive power, while many assert that it is positively injurious; but it is its indirect action in preparing the plant for assimilation that is supposed to warrant its use. It gives such an offensive odor that fertilizers compounded with it cannot be kept in general stores, and thus the distribution of fertilizers is hindered. If it is shown that the crude phosphate alone, or combined with other effective plant foods, is serviceable as a fertilizer, this expense and many difficulties will be overcome. The cost of mineral manures will be reduced one half, and an immense impetus will be given to the mining of phosphate and its extensive use by the farmers upon the worn-out fields that are everywhere craving its renewing and stimulating effects. For several years past Mr. Andrew H. Ward, of Boston, has ardently and persistently advocated the use of crude phosphate without acid treatment, and he possesses a mass of testimony in support of his theories that appears to thoroughly confirm them. From this formulæ the Economic Fertilizer Co., of which Messrs. Butler, Breed & Co., of Boston, are agents, prepare fertilizers without sulphuric acid, and are *slowly* but *surely* bringing them into use. Mr. Ward frequently addresses the farmers upon this theme and also writes extensively for the newspapers. From recent articles contributed by him to the *Boston Globe*, we quote some testimony from the highest authorities as to the value of crude phosphates as a manure. Professor Storer, of the Agricultural Department of Harvard College, in his recent valuable work entitled "Agriculture," says, "It has repeatedly been proved by experiment that plant roots, that are abundantly supplied with nitrogenous and potassic food, can readily obtain phosphoric acid from powdered phosphatic guano, and even from powdered rock phosphate, and several observers have noticed that many of the natural phosphates are attached to an appreciable extent in the compost heap. One great trouble in regard to superphosphates is that most of them cannot be kept for any great length of time without suffering deterioration. The soluble phosphoric acid contained in them is liable to go 'back,' as the term is, or to 'revert,' as is sometimes said, to an insoluble state. English chemists think so little of reverted phosphoric acid that they put no value upon it. The pound

of useful phosphoric acid can generally be bought for the least money in the form of finely powdered phosphate rock, such as is sold under the name of 'floats.' In many situations farmers would probably find an advantage in using this material, either directly upon soils surcharged with humus, or perhaps in composts, as well as by treating it with sulphuric acid. With regard to the manner in which the phosphoric acid which has become fixed in the earth is made soluble again for the use of plants, it is sufficient to say that among the various means by which this result may be accomplished the action of carbonic acid water, and of the acid juices exuded by plant roots are conspicuous." There are, withal, special situations, soils and crops where an instructed farmer might find it profitable to use a cheap insoluble phosphate rather than the costly soluble product prepared from it.

Sir J. B. Lawes, the highest agricultural authority in Great Britain, says, "Although phosphates under every possible form have been under experiment here for forty years, I have nothing conclusive to bring forward in regard to the great superiority of soluble over insoluble phosphates."

Director George H. Cook, in the sixth annual report of the New Jersey Experimental Station, for 1885, says: "The more difficult the solubility of these phosphates the less their price; while on the other hand it is claimed that under certain, and not unusual conditions, the lower priced ones will give the largest returns in increased crops. A more useful work could hardly be undertaken by the Experiment Station than a series of field experiments for the purpose of testing these claims."

"In the trials begun in 1885 at this station, in the case of five experiments out of the eight on different forms, the phosphate being used with potash and nitrogen compounds, the increase of crop was greater with the more insoluble phosphate than with the more expensive superphosphate, and that in three of these five cases the 'floats,' the cheapest of all, did the best work—goes a little way, at least, toward showing that the superphosphate may have had its day." Mr. W. H. Bowker, in his lecture on "Homœopathy and Agriculture," says: "There may be places where insoluble phosphates can be advantageously applied, as upon lands covered with fruit trees or devoted to grass. Perennial plants, like grasses and trees, no doubt extract phosphoric acid more readily than annual plants, owing to their numerous and well-developed roots. Winter grains, especially wheat, from the long time it occupies the ground, and its growth in the fall, may also be benefitted by an insoluble or partially insoluble phosphate." Calling attention to these statements, Mr. Ward says that in 1884 more than four-fifths of the cultivated land in New England was comprised in the hay crop, while the pasturage adds a vast acreage. If it be admitted that the crude phosphates are serviceable even to grass alone, an incalculable field is opened for their use.

There is no subject of greater importance to Canada than this one, and it is to be hoped that our Agricultural Bureau will give earnest attention to experiments that may tend to supply our farmers with a cheap and effective fertilizer, easily obtained, pleasant to handle, and inviting confidence by its simplicity. This would render more "protection" to agriculture than can be obtained from any amount of fiscal legislation, and would utilize extensively the valuable phosphate deposits which Canada has the good fortune to possess.

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MANITOBA AND CANADIAN NORTH-WEST.

Deep soil, well watered, wooded and richest in the world—easily reached by railways. Wheat—average 30 bushels to the acre, with fair farming.

The Great Fertile Belt

Red River Valley, Saskatchewan Valley, Peace River Valley, and the Great Fertile Plains, Vast Areas, suitable for Grains and the Grasses, largest (yet unoccupied) in the world.

VAST MINERAL RICHES—GOLD, SILVER, IRON, COPPER, SALT, PETROLEUM, ETC., ETC.

IMMENSE COAL FIELDS—ILLIMITABLE SUPPLY OF CHEAP FUEL.

Railway from Ocean to Ocean!

ROUTE—Including the great Canadian Pacific Railway, the Grand Trunk Railway, and the Intercolonial Railway, making continuous steel-rail connection from the Atlantic to the Pacific Ocean through the great Fertile Belt of North America and the magnificently beautiful scenery of the North of Lake Superior and the Rocky Mountains.

New Route from England to Asia, wholly through British territory, and Shortest Line through America to China, Japan, Australia and the East. Always sure and always open.

Climate the Healthiest in the World.

The Canadian Government gives Free Farms of 160 acres to every male adult of 18 years, and to every female, who is head of a family, on condition of living on it, offering independence for life to every one with very little means, but having sufficient energy to settle.

Further and full information, in pamphlets and maps, given free on application by letter, post free, addressed to *Department of Agriculture, Ottawa, Canada*, or to *High Commissioner for Canada, 9 Victoria Chambers, London, S. W., England*, and all Emigration Agents.

Ottawa, September 19th, 1888.

FOR SALE.

List of Choice (selected) Class 1 Farm Lands in the Birtle District, Manitoba.

SECTION.	Township.	Range.	Acres.
Section 3.....	14	23	640
" 15.....	14	23	640
" 17.....	14	23	640
" 19.....	14	23	640
" 23.....	14	23	640
W 1/2 and NE 1/4 35.....	14	23	480
N 1/2 and SE 1/4 19.....	15	23	480
N 1/2 9.....	15	23	320
S 1/2 and NE 1/4 15.....	16	23	480
E 1/2 of NW 1/4 15.....	16	23	80
S 1/2 3.....	17	23	320
S 1/2 17.....	17	23	320
SW 1/4 31.....	18	26	160
NW 1/4 19.....	16	27	160
NE 1/4 25.....	16	26	160
N 1/2 of N 1/2 23 and N 1/2 of NW 1/4 24.....	13	1	240
			6,400

The above lands are well watered, and were specially selected by an experienced Manitoban for the present owner.

The Canadian Pacific Railway runs within near distance; the Great North-West Central Railway runs directly through the centre of Township 14, Range 23, and within easy distance of the other lots, and, in addition, the Manitoba and North Western Railway runs through Township 17, Range 23, so that farmers in this vicinity have their choice of outlet.

These lands will be sold in quarter sections or *en bloc* to suit purchasers. A magnificent chance for any gentleman desiring to go into profitable farming. The surplus yield of wheat for export this year (1888) is estimated at twenty million bushels, besides a large yield of barley, oats, &c. All Government lands in this vicinity have been sold. The district in which these lands are situated is immediately in the centre of the great wheat growing belt.

EASY TERMS OF PAYMENT.

NO CASH DOWN REQUIRED.

Apply to

A. C. R.,

OFFICE OF THE CANADIAN MINING REVIEW,
OTTAWA.

RECENT OPINIONS OF THE PRESS.

The following extract is from the *Toronto Empire* of recent date:

Some idea of the immensity of the harvest in Manitoba may be gathered from the large demand for men existing there at the present time. A Westbourne, Man., despatch of August 27th says: "Men are very scarce. We hear that \$2.50 a day, with board, is offered."

From Meadow Lee the report is: "Good farm-labourers seem to be very difficult to get."

Mr. Metcalf, at the Intelligence office of the Dominion Government at Winnipeg, says he could place 700 labourers during harvesting operations if he only had them. The demand is very great, good men very scarce.

The *Winnipeg Sun* of August 25th says: "A number of farmers from the surrounding country are in the city daily looking for farm hands to assist in reaping the present crop. Good, experienced hands are scarce, and consequently high wages are being paid."

A. C. Fraser, Mayor of Brandon, writes of that district: "Wheat will yield 25 to 35, oats 50 and upwards, and barley 40 to 50 bushels per acre. The present prospects for settlers in Manitoba are first-class. Our country has some drawbacks, but, as far as my experience goes, is one of the best on the American continent. There are particularly good openings in this district for cheese and butter factories."

A. G. McDougall, secretary County Dennis Agricultural Society, Virden, says: "Wheat will yield about 36 bushels, oats 45 bushels, and barley 40 bushels per acre. Settlers round here, with a crop this year like last, should be in a very prosperous condition."

Mr. Thomas Nicholl, Reeve of Oakland, Manitoba, writes of the district in which he lives: "The yield of wheat will be 25 bushels, of oats 45, and of barley 40 bushels per acre." Speaking of the present prospects for settlers in that part of the country he says: "There are some homesteads open yet, but they are inferior. There is plenty of land for sale at from \$5 to \$7 per acre, and every man who is careful succeeds at farming here. I had the experience in Ontario of going upon a new farm, and must state, for the benefit of those who have to make a new start in life, that to buy land east at a high price, or go upon timbered land to make a home, is a great mistake while prairie lands are to be had. In choosing a location in this country buy in S.E. Manitoba if you can, and there is plenty yet. Ontario people all succeed here. Very few are dissatisfied."

Mr. D. Peters, Reeve of Douglas, Man., writes: "Wheat will yield 25 bushels, oats 50 to 70, and barley 45 bushels per acre. The present prospects for settlers are the best ever known. Everything is prospering well."

Mr. John Lowe, Deputy Minister of Agriculture, returned from a trip to Manitoba to-day. Like all recent visitors to that wonderful country, he was simply charmed by the crop prospects. Everybody, he says, has the best farm, and it is expected that there will be fully 20,000,000 bushels for export. As a sample of crop growth, he says that at the Lowe farm, near Morris, a cow broke into a field of oats, and while standing among them nothing could be seen but the tip of the animal's horns. Mr. Lowe was in Manitoba when the cold dip took place, and bears out the reports of *The Empire* correspondent that the quantity of wheat injured by the frost will be infinitesimally small.

Every Canadian farmer has heard and read much about the vast resources and capabilities of the great North-West, but a personal inspection of the country is much more valuable than second-hand information, be it ever so reliable. Before forsaking the old, but probably overcrowded, homestead in Ontario, the farmer wants to satisfy himself that a removal farther west would be a change for the better. It is for the benefit of these people principally that the Canadian Pacific Railway Company are running excursions, and the farmers have not failed to appreciate the advantages they afford. The crowd was so great last night that several additional cars had at the last moment to be hitched on so as to make provision for everyone. Major Peel, the travelling passenger agent of the C.P.R., saw the excursionists safely aboard, and then Mr. W. T. Bocknell took charge of the party. He will accompany them to their destination, which is Langenburg, on the Manitoba and North-Western, and 200 miles west of Winnipeg.

Ottawa *Free Press*, 10th August, 1888:

Mr. A. Mutchmor, of the firm of Mutchmor, Gordon & Co., has just returned from a ten weeks' sojourn in Manitoba. He reports the crops in the prairie province the best he ever saw in any country in the world. With the exception of one or two localities the frost has not injured the grain to any extent, and as harvesting commenced generally in the province on the 20th inst., the danger is now past, except to very late grain, the proportion of which is very small, as the farmers are all alive to the importance of very early sowing and planting to avoid early frosts. Farm lands are in great demand and a number of sales made, especially in Southern Manitoba on account of the rich fertile soil and proximity to the best markets. Through competition in freight rates to Duluth or Port Arthur, five cents per bushel extra at these terminal points, enhances the value of every acre of land in these localities in the same proportion, and this advantage will exist for years to come. With the exception of a few jealous and disappointed individuals interested in other railway schemes of their own, for which they have been expecting aid from the local Government, the contract now under consideration by the Legislature between the Government and the Northern Pacific Railway Company is generally regarded with favour as the best that can be made at present in the interest of the province as a whole, for the reason that it is the only channel through which competition in freight rates can be secured for the present crop. A reduction of eight cents per bushel is promised, but suppose it is only five cents per bushel upon the surplus of the present crop, it will more than pay the cost of the railways now under construction. This is the standpoint of Premier Greenway and Attorney-General Martin, and it will be found to be the popular one in the province, as it appeals directly to the pockets of the people, by insuring them a better price for their grain. Thousands of dollars will be invested in farm lands in the prairie province this fall, and no safer and better investment can be made, as a tremendous immigration is bound to take place from all parts of the world within the next year.

Canadian Fertilizer Industry.

The only attempts so far made to utilize Canadian phosphate at home have been at the fertilizer factories in Brockville and Smith's Falls, Ontario. The factory at Smith's Falls was established originally for the manufacture of chemicals of various kinds, but a few years ago the production of fertilizers was tried as an experiment, and as a very good article was made, with no adulterations, it got a good name and the demand has been steadily increasing. Mr. R. J. Brodie, a graduate of McGill College, has charge of the works. Mr. Brodie states that he makes the sulphuric acid from pure sulphur. He gets rid of the hydrofluoric acid gas, which is produced by the action of the sulphuric acid on the apatite, by a simple arrangement of wooden chimneys, thus solving a difficulty which has embarrassed many persons in their first efforts to use Canadian phosphate. He makes a "complete fertilizer," that is, a mixture of the three principle ingredients of plant food, namely: phosphate, potash and ammonia. The demand is growing in a very encouraging manner, for when a farmer tries it once he generally comes back for more. Mr. Brodie says he could sell many thousand tons the coming year if he could make it, but the factory is small and the facilities not very great.

There is evidently a large and extending field in this direction both for profit and usefulness. The soil of the older settled Provinces of Canada has become impoverished by many years of cropping without replenishment, and districts that once yielded great stores of grain now only afford the scantiest pasturage. If one was animated only by patriotic and philanthropic zeal he could render no greater benefit to his country than to

enter on a missionary crusade to enlighten the farmers to the value of mineral manures; or if he likes to make his benevolence profitable to himself let him supply the article with which the farmer may prove the truth of his teachings. The establishment of fertilizer factories in Canada and the education of the farmer in the use of manure is a cause that invites the best attention both of the capitalist and of the Government.

Soluble and Insoluble Phosphates.

A. H. Ward, Boston.

Another comparative experiment with phosphate made by the Pennsylvania State College Experiment Station confirms experiments made by the New Jersey Experiment Station and many others, and shows that the less soluble and cheaper forms of phosphoric acid are likely to prove equal or superior to the more costly soluble acid phosphates.

The results of these various experiments should be well known by the various experiment stations, and, if they are known, what justifies them in making so great a difference in value as 400 per cent. between soluble and insoluble phosphates? It all comes out of the farmers.

A bulletin of the Pennsylvania State College Experiment Station gives the results of experiments made with phosphates in a four-crop rotation in the years 1883-7, the first year's crop being grown without manure, to determine the relative fertility of the several plots. The plots were twelve in number, each of them one-twentieth of an acre in extent, and the soil is what is usually called limestone clay. Oats were grown in 1883, and the product showed considerable variation in the fertility of the several plots. Taking 100 as the average of all, they ranged from 91.62 to 114.52, eight being under the average and four over it. The rotation was in the order of wheat, grass, corn and oats, and the fertilizers were applied to wheat and corn only—the grass and oats getting the residual effects. Two plots were unmanured throughout the experiment, and from the results of these the values of the fertilizers were computed. The experiments were made to study the effects of different forms of phosphoric acid, and to guard against failure from a lack of any of the elements of plant food, each of the plots, except the two unmanured ones, as treated to 200 pounds of muriate of potash and 240 pounds of sulphate of ammonia per acre. They were thus supplied with nitrogen, potash, sulphuric acid and chlorine, while the limestone soil contained a vast excess of lime, magnesia and iron above what the crops could possibly use. Two of the plots received no other manuring, and the remaining eight were treated in pairs as follows:

1. 200 pounds dissolved boneblack, the phosphoric acid largely soluble.
2. 200 pounds dissolved backbone, previously treated with lime; phosphoric acid largely reverted.
3. 150 pounds fine ground bone.
4. 150 pounds ground South Carolina phosphate; phosphoric acid largely insoluble.

These fertilizers were all standard articles of trade. Now for the results. Of the 56 single cases recorded, 36 show unmistakable gain resulting from the use of phosphoric acid, six show a probable gain, eight a doubtful gain, and the remaining six an apparent loss. But the results give no satisfactory proof that one form of phosphoric acid is superior to another. It would appear, however, that a limestone soil is not the

most suitable for a phosphate fertilizer, owing to the circumstance that it precipitates the superphosphate so quickly as to prevent due distribution to the roots of plants. A comparison of the results obtained in the experiment with the results of other experiments appears to justify the conclusion that "upon lime soils, upon very light sandy soils, and upon pure peat soils, the less soluble and cheaper forms of phosphoric acid are likely to prove equal or superior to the more costly soluble acid of the superphosphates. But the director of the Pennsylvania station wisely enjoins caution in departure from established practices. A few simple and inexpensive trials of reverted or insoluble phosphates on a small scale would readily show one contemplating their use whether they were likely to prove profitable under these circumstances or not. No general rule can apply to every soil.

Directions for Composting Muck or Peat.—Take $1\frac{1}{4}$ cords peat, which, as dug out, will weigh about 11,225 pounds, and, well dried, will lose three-quarters in bulk, and weigh about 2,500 pounds. Add to this quantity 100 pounds of soda ash and 1,200 pounds of fine ground raw phosphate. After all these ingredients are mixed together, it is left in a heap to heat and ferment, which generates carbonic acid and ammonia, both of which act on the raw phosphate, rendering it soluble. The compost, after lying about six weeks, will have fermented, and should be shovelled over, when it is fit for use, and by exposure and evaporation the weight will be reduced to about 4,000 pounds, or two tons. The following shows cost and constituents of two tons peat compost: Peat, $1\frac{1}{4}$ cords, as dug out, \$2.00; raw phosphate, fine ground, 1,000 lbs., \$4.00; soda ash, 80 per cent., 100 lbs., \$3.00; labour, \$2.00; total cost for two tons, \$11.00

Ground Phosphate.—A conviction of the utility of the application of crude phosphate to the soil is steadily gaining way. Experiments with Canadian phosphate at Newport during the past season have shown a marked effect upon grape vines in hot-houses, and its effect upon garden plants has been established beyond dispute. Many small manufacturers are glad to get the ore in the pulverized state for treatment with acid, and there seems to be much encouragement for the erection of grinding mills. In the future it is probable that the high grade ore will be selected for shipment abroad in the crude state, and all the low grade ore will be ground and raised in quality by freeing it from mica and other impurities. The market for this will be found in the United States and Canada. More active exertions ought to be made by the Department of Agriculture to impress upon farmers the desirability of using phosphoric manures. It is thought that Kingston affords a favourable site for the erection of phosphate grinding mills. Coal can be had cheaply there, and the phosphate can be brought to it at low rates by the Rideau Canal, and exported as ballast in the lake schooners. It is likely that this enterprise will be undertaken before long, and will have a marked effect in stimulating the phosphate industry.

The Fertilizer Trade in South Carolina.—The activity of the fertilizing industry has not been confined to Charleston, nor to the State, for there are many manufactories in

other Southern States that use the South Carolina phosphates for the manufacture of fertilizers. The business of these concerns is prosperous. This business is a boon to railroads and steamship lines. The shipments for the past three months, from Charleston alone, required over 1,500,000 sacks to hold the material. Over 2,062,500 pounds of burlaps were used in making the sacks, and over 11,250 cars were required to transport them, filled with fertilizers, over the railroads. The Charleston companies will consume, in making the year's supply of fertilizers, over 70,000 tons of phosphate rock, and nearly half as much sulphur, besides kainit, marl, potash, blood, fishscraps, bone black, azotin, nitrogen, tankage, cotton seed meal, and other materials.

In those parts of Europe where the sugar beet is largely grown—Belgium and Denmark, for instance—no fertilizer has been found equal to phosphate, and the same remark might well be applied to the grain producing farms of our older provinces. The rigid inspection to which the crude materials is subject in England tends greatly to keep up the standard of our shipments, and the high percentage of Canadian phosphate will always secure for it a foremost place and an eager demand. Prof. Dawkins, comparing the phosphate obtained from various countries, states the percentage that Canada yields, out of a mean of analysis, is 87.52 of tribassic phosphate of lime.

Phosphate of lime (apatite) was first discovered in Burgess, Ontario, in 1847. In 1860 the first shipment of the mineral was made, amounting to about 100 tons.

The earliest discovery of apatite in the County of Ottawa was made in 1829 by Lieut. Ingall, of the 15th Regiment, while engaged in certain geological explorations. Mining operations were not engaged in until 1873.

The entire phosphate beds of South Carolina, so far as discovered and defined, have been estimated to cover an area of 240,000 acres. It was not known that the rock possessed any commercial value until the year 1865.



Department of Inland Revenue.

An Act Respecting Agricultural Fertilizers.

The public is hereby notified that the provisions of the Act respecting AGRICULTURAL FERTILIZERS came into force on the 1st of January, 1886 and that all Fertilizers sold thereafter require to be sold subject to the conditions and restrictions therein contained—the main features of which are as follows:

The expression "fertilizer" means and includes all fertilizers which are sold at more than TEN DOLLARS per ton, and which contains ammonia, or its equivalent of nitrogen, or phosphoric acid.

Every manufacturer or importer of fertilizers for sale, shall, in the course of the month of January in each year, and before offering the same fertilizer for sale, transmit to the Minister of Inland Revenue, carriage paid, a sealed glass jar, containing at least two pounds of the fertilizer manufactured or imported by him, with the certificate of analysis of the same, together with an affidavit setting forth that each jar contains a fair average sample of the fertilizer manufactured or imported by him; and such sample shall be preserved by the Minister of Inland Revenue for the purpose of comparison with any sample of fertilizer which is obtained in the course of the twelve months then next ensuing from such manufacturer or importer, or collected under the provisions of the Adulteration Act, or is transmitted to the chief analyst for analysis.

If the fertilizer is put up in packages, every such package intended for sale or distribution within Canada shall have the manufacturer's certificate of analysis placed upon or securely attached to each package by the manufacturer; if the fertilizer is in bags it shall be distinctly stamped or printed upon each bag; if it is in barrels, it shall be either branded, stamped or printed upon the head of each barrel or distinctly printed upon good paper and securely pasted upon the head of each barrel, or upon a tag securely attached to the head of each barrel; if it is in bulk, the manufacturer's certificate shall be produced and a copy given to each purchaser.

No fertilizer shall be sold or offered or exposed for sale unless a certificate of analysis and sample of the same shall have been transmitted to the Minister of Inland Revenue and the provisions of the foregoing sub-section have been complied with.

Every person who sells or offers or exposes for sale any fertilizer, in respect of which the provisions of this Act have not been complied with—or who permits a certificate of analysis to be attached to any package, bag or barrel of such fertilizer, or to be produced to the inspectors to accompany the bill of inspection of such inspector, stating that the fertilizer contains a larger percentage of the constituents mentioned in sub-section No. 11 of the Act than is contained therein—or who sells, offers or exposes for sale any fertilizer purporting to have been inspected, and which does not contain the percentage of constituents mentioned in the next preceding section—or who sells or offers or exposes for sale any fertilizer which does not contain the percentage of constituents mentioned in the manufacturer's certificate accompanying the same, shall be liable in each case to a penalty not exceeding fifty dollars for the first offence, and for each subsequent offence to a penalty not exceeding one hundred dollars. Provided always that deficiency of one per centum of the ammonia, or its equivalent of nitrogen or of the phosphoric acid, claimed to be contained, shall not be considered as evidence of fraudulent intent.

The Act passed in the forty-seventh year of Her Majesty's reign, chaptered thirty-seven and entitled, "*An Act to prevent fraud in the manufacture and sale of agricultural fertilizers*," is by this Act repealed, except in regard to any offence committed against it or any prosecution or other act commenced and not concluded or completed, and any payment of money due in respect of any provision thereof.

A copy of the Act may be obtained upon application to the Department of Inland Revenue, as well as a copy of a Bulletin which it is proposed to issue in April, 1888, concerning the fertilizers

E. MIALL,

15th Dec., 1887.

Commissioner.

L. T. ROCHON

(Successor to C. Neville)

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MONEY ORDERS.

MONEY ORDERS may be obtained at any Money Order Office in Canada, payable in the Dominion; also in the United States, the United Kingdom, France, Germany, Italy, Belgium, Switzerland, Sweden, Norway, Denmark, the Netherlands, India, the Australian Colonies, and other countries and British Colonies generally.

On Money Orders payable within Canada the commission is as follows:

If not exceeding \$4	2c.
Over \$4, not exceeding \$10	5c.
" 10, " " 20	10c.
" 20, " " 40	20c.
" 40, " " 60	30c.
" 60, " " 80	40c.
" 80, " " 100	50c.

On Money Orders payable abroad the commission is:

If not exceeding \$10	10c.
Over \$10, not exceeding \$20	20c.
" 20, " " 30	30c.
" 30, " " 40	40c.
" 40, " " 50	50c.

For further information see OFFICIAL POSTAL GUIDE.

Post Office Department, Ottawa.
15th Sept., 1888.



SEALED TENDERS addressed to the undersigned, and endorsed "Tender for Post Office, Goderich, Ont.," will be received at this office until Monday, 15th October, 1888, for the several works required in the erection of Post Office, &c., at Goderich, Ont.

Specifications and drawings can be seen at the Department of Public Works, Ottawa, and at the office of the Town Clerk at Goderich, Ont., on and after Wednesday, 5th Sept., and tenders will not be considered unless made on the form supplied and signed with actual signatures of tenderers.

An accepted bank cheque, payable to the order of the Minister of Public Works, equal to five per cent. of amount of tender, must accompany each tender. This cheque will be forfeited if the party decline the contract, or fail to complete the work contracted for, and will be returned in case of non-acceptance of tender.

The Department does not bind itself to accept the lowest or any tender.

By order,

A. GOBEIL,
Secretary.

Department of Public Works,
Ottawa, 31st August, 1888.)

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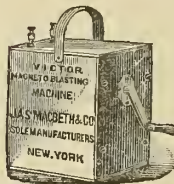
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June 12th, 1888.



Mining Regulations

TO GOVERN THE DISPOSAL OF

Mineral Lands other than Coal Lands, 1886.

THESE REGULATIONS shall be applicable to all Dominion Lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, iron or other mineral deposits of economic value, with the exception of coal.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein, either by surface or subterranean prospecting for mineral deposits, with a view to obtaining under the Regulations a mining location for the same, but no mining location or mining claim shall be granted until the discovery of the vein, lode or deposit of mineral or metal within the limits of the location or claim.

QUARTZ MINING.

A location for mining, except for iron on veins, lodes or ledges of quartz or other rock in place, shall not exceed forty acres in area. Its length shall not be more than three times its breadth, and its surface boundary shall be four straight lines, the opposite sides of which shall be parallel, except where prior locations would prevent, in which case it may be of such a shape as may be approved of by the Superintendent of Mining.

Any person having discovered a mineral deposit may obtain a mining location therefor, in the manner set forth in the Regulations which provides for the character of the survey and the marks necessary to designate the location on the ground.

When the location has been marked conformably to the requirements of the Regulations, the claimant shall within sixty days thereafter, file with the local agent in the Dominion Land Office for the district in which the location is situated, a declaration or oath setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as aforesaid; and shall, along with such declaration, pay to the said agent an entry fee of FIVE DOLLARS. The agent's receipt for such fee will be the claimant's authority to enter into possession of the location applied for.

At any time before the expiration of FIVE years from the date of his obtaining the agent's receipt it shall be open to the claimant to purchase the location on filing with the local agent proof that he has expended not less than FIVE HUNDRED DOLLARS in actual mining operations on the same; but the claimant is required, before the expiration of each of the five years, to prove that he has performed not less than ONE HUNDRED DOLLARS' worth of labor during the year in the actual development of his claim, and at the same time obtain a renewal of his location receipt, for which he is required to pay a fee of FIVE DOLLARS.

The price to be paid for a mining location shall be at the rate of FIVE DOLLARS PER ACRE, cash, and the sum of FIFTY DOLLARS extra for the survey of the same.

No more than one mining location shall be granted to any individual claimant upon the same lode or vein.

IRON.

The Minister of the Interior may grant a location for the mining of iron, not exceeding 160 acres in area which shall be bounded by north and south and east and west lines astronomically, and its breadth shall equal its length. Provided that should any person making an application purporting to be for the purpose of

mining iron thus obtain, whether in good faith or fraudulently, possession of a valuable mineral deposit other than iron, his right in such deposit shall be restricted to the area prescribed by the Regulations for other minerals, and the rest of the location shall revert to the Crown for such disposition as the Minister may direct.

The regulations also provide for the manner in which land may be acquired for milling purposes, reduction works or other works incidental to mining operations.

Locations taken up prior to this date may, until the 1st of August, 1886, be re-marked and re-entered in conformity with the Regulations without payment of new fees, in cases where no existing interests would thereby be prejudicially affected.

PLACER MINING.

The Regulations laid down in respect to quartz mining shall be applicable to placer mining as far as they relate to entries, entry fees, assignments, marking of localities, agents' receipts, and generally where they can be applied.

The nature and size of placer mining claims are provided for in the Regulations, including bar, dry, bench, creek or hill diggings, and the RIGHTS AND DUTIES OF MINERS are fully set forth.

The Regulations apply also to

BED-ROCK FLUMES, DRAINAGE OF MINES AND DITCHES.

The GENERAL PROVISIONS of the Regulations include the interpretation of expressions used therein; how disputes shall be heard and adjudicated upon; under what circumstances miners shall be entitled to absent themselves from their locations or diggings, etc., etc.

THE SCHEDULE OF MINING REGULATIONS

Contains the forms to be observed in the drawing up of all documents such as:— "Application and affidavit of discoverer of quartz mine." "Receipt for fee paid by applicant for mining location." "Receipt for fee on extension of time for purchase of a mining location." "Patent of a mining location." "Certificate of the assignment of a mining location." "Application for grant for placer mining and affidavit of applicant." "Grant for placer mining." "Certificate of the assignment of a placer mining claim." "Grant to a bed rock flume company." "Grant for drainage." "Grant of right to divert water and construct ditches."

Since the publication, in 1884, of the Mining Regulations to govern the disposal of Dominion Mineral Lands the same have been carefully and thoroughly revised with a view to ensure ample protection to the public interests, and at the same time to encourage the prospector and miner in order that the mineral resources may be made valuable by development.

COPIES OF THE REGULATIONS MAY BE OBTAINED UPON APPLICATION TO THE DEPARTMENT OF THE INTERIOR.

A. M. BURGESS,

Deputy Minister of the Interior.

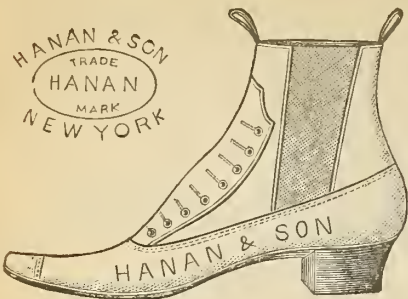
THE CANADIAN MINING REVIEW

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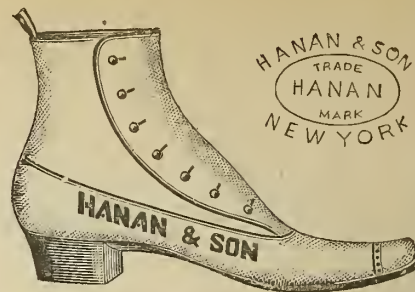
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Ontario Mining Regulations.

The following summary of the principal provisions of the General Mining Act of the Province of Ontario is published for the information of those interested in mining matters in the Algoma District, and that part of the Nipissing District north of the Mattawan River, Lake Nipissing and French River.

Any person or persons may explore for mines or minerals on any Crown Lands surveyed or unsurveyed, not marked or staked out or occupied.

The price of all lands sold as mining locations or as lots in surveyed townships is two dollars per acre cash, the pine timber being reserved to the Crown. Patentees or those claiming under them may cut and use such trees as may be necessary for building, fencing or fuel, or for any other purpose essential to the working of mines.

Mining locations in unsurveyed territory shall be rectangular in shape, and the bearings of the outlines thereof shall be due north and south, and due east and west astronomically, and such locations shall be one of the following dimensions, viz: eighty chains in length by forty chains in width, containing 320 acres, or forty chains square, containing 160 acres, or forty chains in length by twenty chains in width, containing 80 acres.

All such locations must be surveyed by a Provincial Land Surveyor, and be connected with some known point or boundary at the cost of the applicant, who must file with application surveyor's plan, field notes and description of location applied for.

In all patents for mining locations a reservation of five per cent. of the acreage is made for roads.

Lands patented under the Mining Act are free from all royalties or duties in respect to any ores or minerals thereon, and no reservation or exception of any mineral is made in the patents.

Lands situated south of the Mattawan River, Lake Nipissing and French River are sold under the Mining Act at one dollar per acre cash.

Affidavits showing no adverse occupation, improvement or claim should accompany applications to purchase.

T. B. PARDEE,
Commissioner.

Department of Crown Lands, Toronto.

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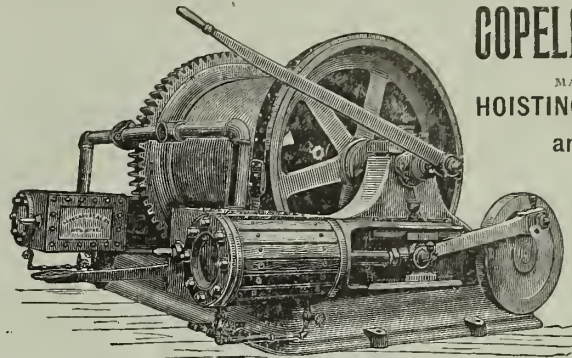


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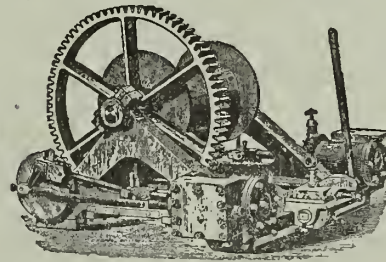
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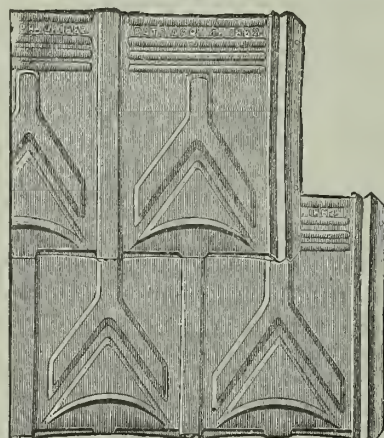
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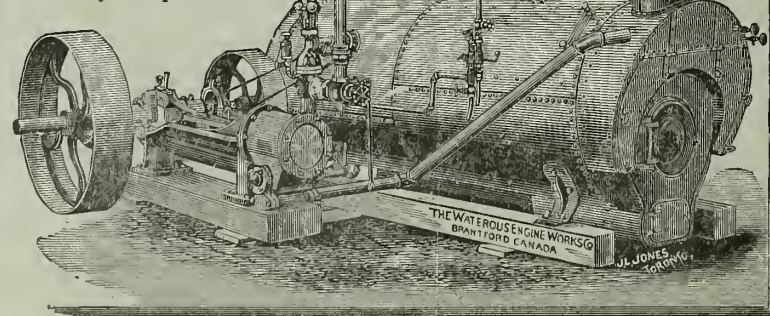
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Cost of Quarrying.—From a paper upon the cost of excavating and handling rock, read recently before the Western Pennsylvania Mining Institute, we excerpt the following:—"The average weight of a cubic yard of sandstone or conglomerate in place is given as 1.8 tons, and of compact granite, gneiss, limestone, or marble two tons, or an average of 1.9 tons, or 4,256 pounds. A cubic yard when broken up ready for removal increases about four-fifths in bulk, and one-fourteenth of a cubic yard, or 177 pounds is a wheelbarrow load. Experience shows that with wages at \$1 per day of ten hours, 45 cents per cubic yard is sufficient allowance for loosening hard rock. Soft shales and allied rocks may be loosened by pick and plow at a cost of 20 cents to 30 cents per cubic yard. The quarrying of ordinary hard rock requires from ¼ pound to ½ pound, and sometimes ½ pound, of powder per cubic yard. Drilling with a churn driller costs from 12 to 18 cents per foot of hole bored. Upon these data Mr. Rigly estimates the total cost per cubic yard of rock in place, for loosening and removing by wheelbarrow (labor assumed at \$1 per day of 10 hours), as follows: When distance removed is 25 feet total cost equals \$0.537, when 50 feet \$0.549, when 100 feet \$0.573, when 200 feet \$0.622, when 500 feet \$0.768, when 1,000 feet \$1.011, and when 1,800 feet \$1.401. This is exclusive of contractor's profit.

When labor is \$1.25 per day, add 25 per cent. to the cost prices given; when \$1.50 per day, add 50 per cent., and so on. In handling by cart, the cost of loading, which will be about 8 cents per cubic yard of rock in place, and the additional expense of maintaining the road, must be added. Allowing, then, 851 pounds as a cart load, the total cost per cubic yard is estimated, when removed 25 feet, at \$0.596, when 50 feet at \$0.599, when 100 feet \$0.603, when 200 feet \$0.617, when 500 feet \$0.655, when 1,000 feet \$0.717, and when 1,800 feet \$0.940.

A New Calculating Machine.—One of the most ingenious of recent American inventions is a calculating machine called "The Comptometer." It is the work of a resident of Chicago and with its aid the most complicated mathematical computations can be made with great accuracy, ease and swiftness. The instrument is 14½ in. long, 7½ in. wide, 5 in. high, and weighs 8 lbs. It can be placed upon an ordinary table. It differs from all other machines of this character, as it can be worked with type writer keyboard. This machine performs large multiplications in a second of time. It was recently tried by the official experts at the Treasury at Washington. Various examples not previously known to the inventor were given to him for the testing of his apparatus, as well as to experts detailed from the treasury. The machine always surpassed the experts in speed and was invariably correct. The inventor was given an example like the following:—Suppose you bring £234 from England to New York, where the rate of exchange is 48½ dols., what is the American value of your money? In one second of time this marvellous calculating machine recorded the correct answer of 1,134-60¾ dols.

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A Sound Mind is a Sound Body

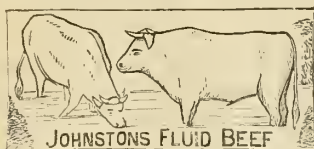
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That they are not only holding their own against the wear and tear of life, but are GAINING GROUND, and

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Fluid Beef

TAKEN REGULARLY will not only keep up the strength, but by abundantly supplying the NOURISHMENT needed by BRAIN, BONE and MUSCLE, will build up a

STRONG AND ROBUST CONSTITUTION.

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Easy to Operate, Strong, Durable,
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JAMES MACBETH & CO.,

Manufacturers of Exploders and Batteries.

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For sale by leading Powder Co's and dealers.

FOR SALE.

A COAL MINE IN CAPE BRETON,

Area, 970 acres, underlaid by 6 or 7 beds of the best Coal in Nova Scotia. The property is estimated to contain from 50 to 60 million tons of Coal. No Coal Mine can be more easily or cheaply operated. The angle of dip is 6 degrees, and the rock stratification is remarkably even and without fault or break.

Apply to

ALEXANDER CAMPBELL,
Annapolis Royal, N.S.

12th, 1888.

Terrible Experience of Miners Shut up in a Coal Mine.—Last month two men employed at the Draper Colliery, Gilberton, Pa., had a very trying experience by being 'closed in' by a fall for a period of about twelve hours, most of which time they were in doubt as to whether they would be rescued. The men were engaged in robbing a pillar and were at the face of the workings when a fall behind them closed the breast and cut them from the gangway. This occurred about 9 o'clock in the morning, but the fact that the men were closed in was not discovered until 4 in the afternoon. Mine Inspector Stein happened to arrive at the colliery about the time the discovery was made and at the risk of his life went into the workings adjacent to where the men were entombed and discovered that they were living and well, but without light. He remained and directed the work of rescuing the men from their perilous position, which was accomplished about three hours later at the risk of the lives of the force of about 30 men who took part in the work. During their imprisonment the men cut a heading four feet long into a pillar, into which they went for safety. Most of the work was performed in the dark as their light became extinguished for want of oil soon after the fall occurred. The men say they had a terrible experience.

The Great Explosives.—The composition of some of the modern high explosives is as follows:—Dynamite—75 parts of nitro-glycerine and 25 of infusorial earth. Dualine—80 parts nitro-glycerine and 20 of nitro-cellulose or gun cotton. Rendrock—40 parts of nitro-glycerine, 40 nitrate of potash or soda, 13 of cellulose and 7 of paraffine. Giant powder—36 parts of nitro-glycerine, 48 of nitrate of potash or soda, 8 of sulphur and 8 of resin or charcoal. Mica powder—52 parts of nitro-glycerine and 48 of pulverized mica. Tonite—52½ parts of gun cotton and 47½ of nitrate of baryta. Blasting gelatine—82 parts of nitro-glycerine and 8 of gun cotton. Atlas powder—75 parts of nitro-glycerine, 21 of wood fiber, 5 of carbonate of magnesia and 2 of nitrate of soda. Rackarock—77.7 parts of chlorate of potash and 22.3 of nitro-benzol.

The Transvaal Gold Output.—For the Witwatersrand district as reported by the local newspaper, to include July, has been as follows:

	Ounces.	Value.
January	11,289	\$197,557 50
February	12,169	212,957 50
March	14,706	257,355 00
April	15,853	267,427 50
May	19,022	332,535 00
June	16,318	269,297 00
July	19,963	349,352 50

Total of district \$1,886,432 00
Monthly average 269,490 28

For the same period the product of the De KAAP field was 109,242 ounces worth, say, \$1,738,114.

Mineral Production of France.—Provisional returns of the mineral production of France in the first six months of the year give the output of coal, including anthracite and lignite, at 11,077,721 tons, an increase of 798,734 tons as compared with the same period of 1887. The production of pig iron was 821,824 tons in 1888, and 764,643 tons last year; of wrought iron, 428,076 tons, and 378,897 tons in the two years respectively; and of steel, 239,624 tons and 240,313 tons.

ALEX. RANKIN,

20 Toronto Street, Toronto Ont.

Agent for sale of Mines and Mineral Lands.

CORRESPONDENCE SOLICITED.

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FOR SALE.

Second-Hand Mining Machinery.

7 Drill Ingersoll Air Compressor.

80 H.P. Return Tubular Boiler.

Ingersoll Rock Drills, &c.

All equal to new; for sale at large reductions.

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COATICOOK, QUE.

REAL ESTATE & FINANCIAL AGENT

Special attention given to Mining properties, having unusual facilities for disposing of same if really good. Shipper of Butter and Cheese to England; liberal advances made thereon. Money to loan on first mortgage or other property of any description. Valuable Copper Mine on hand for sale.

E. H. SARGENT & CO.,

IMPORTERS AND DEALERS IN

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Chemicals and Laboratory Supplies.

125 State Street,

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THIS YEAR'S

MYRTLE

CUT AND PLUG

Smoking Tobacco

FINER THAN EVER.

SEE

T & B

In Bronze on Each Plug and Package.

THE DOMINION

SAFETY BOILER CO.

MANUFACTURERS OF

The "Field-Stirling" Patent High Pressure Boiler,

The Safest and Cheapest Steam-Generator now in Use.

This Boiler is unusually durable, being made of the best steel and wrought iron exclusively. No cast-iron is employed. It is simple in construction, has a rapid, well-defined circulation, and a large cool mud-drum, where all impurities are collected to be blown off. All parts of the Boiler are readily accessible for the closest inspection. It has great excess of strength and is not liable to be strained by unequal expansion. The water space is divided into sections so arranged that NO EXPLOSION IS POSSIBLE.

Some of Our Leading Customers:

The J. A. Converse Mfg. Co. (A. W. Morris & Bro.), Montreal; The Canada Sugar Refining Co., Montreal; The Pillow and Hersey Mfg., Montreal; The Berthier Beet Root Sugar Co., Berthier, Que.; The Imperial Insurance Co., Montreal; The Massey Manufacturing Co., Toronto; The Acadia Coal Co. (Ld.), Stellarton, N.S.; Canada Paper Co., Windsor Mills, Que.; Royal Electric Co. (Central Station), Montreal; Dodge Wood Split Pulley Co., Toronto, and a repeat order from A. W. Morris & Bro., after five months' experience; Ingersoll Rock Drill Co. of Canada.

We guarantee Dry Steam and Great Economy of Fuel. Correspondence Solicited.

J. FRASER TORRANCE, M.E.,

P.O. Box 1707, Montreal.

Manager.

The Canadian Mining Review

CONDUCTED BY B. T. A. BELL

OFFICES:

UNION CHAMBERS, 14 Metcalfe St.
OTTAWA.

Vol. VI. OCTOBER, 1888. No. 10.

Mineral Wealth of the Great Mackenzie Basin.

The report of the select committee of the Senate appointed to enquire into the resources of the Great Mackenzie Basin has appeared in the form of a blue book, containing a large amount of very valuable information regarding a comparatively unknown district of Canada. That part of the report which principally concerns the readers of the CANADIAN MINING REVIEW, however, is the space devoted to minerals and mines. The evidence on this point given before the committee shows that very little is known of the mining capabilities or of the minerals of the district east of the Mackenzie River and north of the Great Slave Lake. But from the evidence elicited respecting the country west of the Mackenzie, and of the rivers there joining it, the Peace and the Liard, the fact appears that there are between 150,000 and 200,000 square miles of territory which may be considered auriferous. In addition to this, west of the Rocky Mountains gold bearing rocks are met with over an area some 1300 miles long with an average breadth of from four to five hundred miles. Gold, the report says, has also been found on the west shore of Hudson Bay. On the upper waters of the Liard and Peace rivers silver exists, and on the Coppermine River, the very name of which is significant, copper is found. Through the same section of country iron, graphite, mica, gypsum and asphaltum are found, while the petroleum area is so extensive as to justify the belief that the main supply of this article for the whole northern part of America will be produced there, and that shipments of it to Great Britain and Europe will eventually contribute a large part of the ocean traffic which sooner or later must come in and go out via Hudson Bay and Straits.

Salt is found quite extensively in some parts in a pure state, and in others in crystals equal in purity to the best salt rock and in highly saline springs. A curious feature in this connection is the fact that petroleum and salt deposits occur mainly near the line of division between deep water navigation and that fitted for lighter draft vessels, thus giving them possibly a greater commercial value. The report, in speaking of the coal and lignite deposits of the district, says that when the time comes for reducing the iron ores of the Mackenzie Basin, and the transportation of its products by steam sea-going or river vessels, this fuel will be found to be of great value.

Although some years may elapse before the district referred to becomes part of the inhabit-

ed area of Canada, it is some satisfaction to know that there is evidence of abundant mineral wealth there, and that a source of fuel, especially valuable to northern climates, is available for years to come. Judging from analogy, the Mackenzie River Basin will be to Canada what Siberia is to Russia; and as the climate of Siberia has been erroneously recorded as the extreme of cold, although really much like Canada as a whole, so our great north-western river basin will be found correspondingly suitable for settlement, and its mineral wealth will probably be the inducement that will first draw a resident white population.

Minerals and Revenue. — Sales and Lease Systems.

According to the report of the mining statistics branch of the Geological Survey of Canada, the total mineral production of the Dominion may be estimated at \$15,000,000 for 1887. If all this mineral wealth was made a revenue producing power, as is done in the Provinces of Nova Scotia and British Columbia, at say a rate of Lease or Royalty of five per cent, the total income would be \$750,000, which for purposes of illustration of the benefit that can be derived from this source might be portioned out as follows:

Nova Scotia, ...	\$100,000
New Brunswick	100,000
Quebec, ...	100,000
Ontario, ...	100,000
Manitoba	100,000
North West Territories . .	100,000
British Columbia	100,000
Geological Survey	50,000
	\$750,000

In practice, however, under the Lease or Royalty System:— Nova Scotia receives yearly \$126,000, and British Columbia receives yearly \$60,000 to \$70,000, amounts that are yearly on the increase, while under the policy of the sale of minerals, as practiced by the other governments, who at present do not seem to regard our mineral wealth as a revenue producing power, this increase does not take place, as the capital or revenue producing power passes from government control and the compulsory condition of development or working is optional with the purchaser. It is true that some revenue is received from the Sales system but it is not equal, nor can it be compared to the ever increasing revenue that would accrue from Lease or Royalty, with a compulsory condition of yearly and continuous development. Hence it is that holding mineral lands on speculation is the rule under the sale system, and working towards national development, is the system under Lease or Royalty, and as the latter is the British Crown Lands Policy, it ought to be worthy of example for all colonies claiming a loyal allegiance to British laws and customs. The

system of reservation for a time, and then letting the minerals pass from Government or State control, is the United States system, and works well enough so long as development goes on, but that being optional with the owner, after the government has parted with it, work is not in all cases carried on, and interests are bought up to control a section of country, or class of mineral and this unconstitutional tenure prevents others from acquiring the right to work old claims. This is now a cause of complaint in many parts of the Western States, but under the Lease or Royalty system work has to be done to hold the claim, and however small that may be, new discoveries are bound to be made. Under this system too, inspection is more easily enforced for the permanent and continuous working of mines and the securing of safety to the lives of miners, while litigation and costly law suits are the exception not the rule as in the present system of unconditional and irresponsible ownership. Under the Sales system a certain area is conveyed unconditionally, embracing other minerals than that for which it is purchased, and for which the owner has no use, or does not know the use, and these consequently remain unworked; but under the Lease system only the class or vein he discovers or acquires is leased, and any other minerals or veins can be worked or leased to others, and so it is that the largest possible amount of industry to the country is secured on this plan. In all countries where government control and inspection, with compulsory development on the Lease or Royalty system is in force there does mining flourish. As an example we might mention the State of Mexico, where minerals are made the chief source of revenue, under geological conditions similar to the Canadian Northwest, but not so favorable nor as good as regards climate and other conditions. If a policy of compulsory development was enforced, and it ought to be enforced, there can be no doubt of the future wealth and prosperity to be derived from our rich inheritance of mineral wealth in the Provinces of Ontario, Quebec, New Brunswick and the great Northwest Territories. We commend to the attention of our readers the able paper by Mr. Arthur Strauss, on "Foreign Mining Laws," reproduced in this issue of the REVIEW from the Transaction of the Mining Institute of Cornwall.

The Excelsior Copper Mining Co.

Cable advices from London announce the formation in that city of the Excelsior Mining Co. (Limited), with a capital of £450,000 sterling, shares of £1 each, to acquire and work the Harvey Hill Copper mines situated about seven miles from Broughton station on the Quebec Central Railway. The directors of the new corporation are: Lord Elphinston, London; Sir James Marshall, London; Col. Mattison, London; P. A. Appleyard, Vice-President Halifax Joint Stock Bank; with the Hon. H. Mercier,

Premier of the Province of Quebec; Hon. W. W. Lynch, Q.C., D.C.L., ex-Minister of Crown Lands, Province of Quebec, and J. W. Green-shields, Advocate and Crown Prosecutor, Mon-treal, Canadian directors. Mr. J. N. Green-shields, the vendor, receives £10,000. Applica-tions are invited for £150,000 shares. These mines were at one time extensively worked by the English and Canadian Mining Company and are situated on Lot 17, Range 15 of Leeds, County of Megantic, and are on an elevation of about 400 feet above the Bronghton station of the Que. Central R.R. The road on which the principal buildings and the shops are built is on the brow of the hill at about 100 feet below the summit. The property comprises 2,800 acres in fee simple and 1301 acres of mining rights. Part of the lands are said to be good for farming and part are thickly wooded with birch, maple and spruce, of great value for building and for fuel. The copper ores at this locality occur both in courses of veins and in beds. The strata are here for the most part, finely micaceous slates, which from their unctuousity are often called talcose, but are generally not magnesian. The courses as described by Sir William Logan are really irregular and interrupted veins, which do not coincide with the strata either in dip or strike. The bearings of eight of them are from north, to N. 20° E., while others run nearly eastward. Their underlie is generally to the westward, at from fifty to nearly ninety degrees. These veins which appear to have filled up fissures in the slates, are more or less lenticular in shape. Some of them have been traced for as much as 100 fathoms on the surface and are occasionally six or seven feet wide in the thickest part, thin-ning out however, both horizontally and verti-cally. Assays have been made from various quantities of the ore as follows:

Messrs VIVIAN & SONS, Swansea (May 7, 1888)	
Metallic Copper.....	61 per cent.
Silver.....	5 oz. to the ton.
ALSO	
Metallic Copper.....	56 per cent.
Silver.....	5 oz. to the ton.

Messrs. JOHNSON, MATTHEY & Co., Assayers and Melters to the Bank of England, Her Majesty's Mint, &c. (June 23, 1888):—

	Sample No. 1.	Sample No. 3.
Copper.....	59.20	31.40
Iron.....	11.20	9.40
Lead.....	traces	nil.
Bismuth.....	.20	.10
Manganese.....	nil.	.30
Magnesia.....	.30	4.80
Lime.....	.10	10.60
Sulphur.....	24.90	13.40
Carbonic Acid.....	.30	15.20
Phosphorus.....	traces	traces.
Silicious Insoluble Matter.....	2.40	12.60
Water.....	nil.	.30
Silver Oxygen Loss.....	1.40	1.90

No. 1. Produce of Gold.....	Silver... 5 oz. 5 dwts.
No. 3. Produce of Gold.....	Silver... 2 oz. 10 dwts.
Per ton of 20 cwts. of ore.	

The property has been prospected on a large scale in by-gone years, as may be seen by the numerous surface openings, shafts, drifts and an adit. There are twelve shafts, four of which

have been recently worked along with the cross-cut or adit. For a description of these workings and their plant and machinery we cannot do better than quote the words of Mr. J. Obalski, Government Mining Engineer, of the Province of Quebec, who closely examined the property for the new company.

The American Shaft has a depth of 240 feet, is strongly timbered and covered over by a frame building 30 feet 6 inches by 25 feet 6 inches, with boiler house adjoining thereto, and is surrounded by a twelve feet high fence of one hundred feet by eighty feet area. The machinery there consists of a steam hoist and its boiler, and a Cameron Steam Pump. I descended and inspected the shaft. I found several quartz veins intersecting it about 100 feet from the surface. No drifting having been done thereon I could not judge of their importance. At the 240 feet level I found a drift 10 feet by 7 feet by 6 feet on the N. E. side. Therein was seen the beginning of a vein carrying copper ore, commonly known as "Grey Silver" ore. The vein at this point was about 2 inches, and now at a depth of twelve feet shews a width of eighteen inches, and carries the same rich copper ore throughout. This vein which dips westerly gives great promise of immediate good returns.

The Cross-cut or Adit.—I visited and inspected this for a distance of 900 feet from the entrance to the No. 2 Shaft, which is intersected by it. I found several quartz veins that would warrant being thoroughly prospected. At 247 feet from No. 1 Shaft I found two drifts, one running south-west the other north-east from the Adit. The north-east drift seems to have been cut a distance of sixty feet for the purpose of following a quartz vein. At the end of this drift a shaft has been sunk below the level of the Adit to a depth stated to be about 50 feet, and from information gathered from men who had worked therein it seems that ore was struck at its bottom. In the south-west drift which has been run on the same vein as in the other drift, drifting has been carried on for about sixty feet and it has been stoped out about 18 feet in height. The portion of this vein now in view shews rich "Copper glance" and "Erubescite." Much may be expected by sinking on this vein.

No. 2 Shaft:—Stratified Bed, known as Bed Rock Ore:—I descended to the 90 feet level of this shaft and there found that the stratified bed had been stoped out on both sides of the shaft. On the N. E. side the stoping has been done for a distance of about 25 feet by 20 feet upwards on the bed for a height of six feet. The bed proper at that point averages about four feet and widens on the incline westwards. On the S. W. side the stoping has been done for a distance of sixty feet and about fifteen feet upwards on the bed to a height of twelve feet. The bed here shows rich copper ore for a height of about eight feet at the base of the stoping. On examining the side of the slope it shows plainly that the quality and quantity of the ore in the bed improves on its downward course. The bed seems to be the same as is met on the surface east of this No. 2 shaft. At about 500 feet westward of No. 2 shaft it seems that the bed has again been met in the Douglas Shaft at a depth of 86 feet, and likewise at the Kent Shaft which is 1020 feet westward, in the 120 feet level thereof. These two shafts being full of water I could not examine them, (see Sir Wm. E. Logan's report relative to the Kent Shaft). Ore found on the dump of the Douglas Shaft is of the purple variety. I also found in the 90 feet level of No. 2 shaft above the stratified bed and evidently running parallel thereto for a distance of about fifty feet, a quartz vein averaging one foot in thickness and carrying rich purple copper ore.

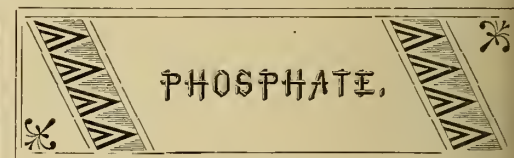
The McGee or Hill Shaft, and Poulin Shaft.—These shafts are situated about 400 feet west of the Kent Shaft—were formerly separate, but were recently connected by an 120 feet incline on the vein. The McGee is 23 feet and the Poulin is 32 feet in depth, the latter having been sunk lower down on the Hill is 29 feet lower than the McGee. The vein now to be seen at the bottom of the McGee shaft was traced and mined into prior to the sinking of the said shaft, for a distance of about forty feet, and in sinking the shaft on the incline the vein thinned out by a fault in the strata and the work was then abandoned. Last October Mr. Lionais, then proprietor, continued work on this vein and had been only a few days so engaged when the vein widened out and this incline was continued on the vein towards the Poulin, simultaneously with the sinking of the Poulin Shaft, and stoping from the Poulin towards the McGee. The Poulin Shaft at the time Mr. Lionais began to sink it was only 27 feet deep, but after deepening it some three feet the same vein which occurred in

the McGee was encountered and stoped on as above stated. The Poulin Shaft has now a depth of 32 feet, and shows besides the vein above mentioned, two other branch veins carrying rich purple ore. The vein now exposed, between the Poulin and McGee averages about four feet in thickness and is remarkably fine, showing fully one foot of solid copper ore, and the remainder of the vein matter rich in disseminated copper. The operations in these shafts warrant great expectations and foremen miners of former companies agree in predicting most favorable results.

Besides the above mentioned works which I have inspected, there are other shafts known under the names of the "Sables," the "Kent," the Douglas, the "Freemont," the "Harvey Hill" and the "Whiteburn." These shafts are full of water but the timbering has been rebuilt recently and they all seem to be in good condition. From conversations with foremen miners who were in charge of these shafts they say that copper was found and taken out of all of them, with the exception of the "Whiteburn," which was sunk with the view of ventilating the "Fanny Eliza" Mine. The "Fanny Eliza" vein is said to have been one of the richest ever worked by the old company. The rock is nearly everywhere sufficiently solid not to need timbering. Certain openings which I visited, and abandoned for over 20 years did not require any timbering. Water is not abundant in the workings on account of the altitude of the Hill and was bailed out formerly by horses with whips. The conditions of the workings is therefore very good. Good miners, both English and French Canadians, can be had in the neighborhood. Around the mines on the Company's property are to be found dwelling houses for Manager and workmen, workshops, forges, stables, scale building, one large engine and boiler house of stone and brick containing four boilers and a one hundred and fifty horse-power engine.

The "Fanny Eliza" vein now under water, which has been followed and stoped out for a distance of 1053 feet as shown on plans at the Mine is—as seen when the work was stopped by the old company—in a condition to be profitably worked.

The above remarks shew plainly that these are not accidental deposits, but are rather a wide field of fissures filled with mineral and interstratified beds. The sinkings have not exceeded a vertical depth of 672 feet below the summit of the Hill, (Extremity of the incline on the Fanny Eliza) and 250 feet on the brow of the Hill. It seems therefore probable, and I have every reason to believe that in sinking deeper, other veins and stratified beds may be encountered, and established by Assays of former and present outputs which show the ore to be remarkably rich and free from impurities. In looking over the Assay Book of the old Co., I find that the Assays of a great number of shipments of Bed Rock and vein ores give from 20% to 50% of metallic copper.



Shipments.

The following are the Shipments from Montreal for month ending October 18th, 1888:—

Date.	Name of Vessel	Destina-tion.	Shippers.	Quan-tity.
S pt. 15	Lar opws.	Liverpool..	L mer, Pehr & Co	80
" 24	Lake Huron.	do ..	Wilson & Green..	1-8
" 26	Femon.	London..	do ..	250
" "	do	do ..	Millar & Co.....	165
" 29	Ripon City ..	do ..	Wilson & Green..	198
" 29	do	do ..	Millar & Co.....	1-0
Oct. 3	Oxenholme..	Liverpool..	Wilson & Green..	657
" 4	Cremont	Hamburg..	do ..	165
" 10	Sarnia.....	Liverpool..	Lomer, Rohr & Co.	50
" 15	Circe	Glasgow...	do ..	2-41
" 15	do	do ..	Wilson & Green.	205
" 15	Lake Superior.	Liverpool..	do ..	221
" 18	Oregon	do ..	Lomer, Rohr & Co	190
Total.....				2,839

RECAPITULATION.

SHIPPERS.

Wilson & Green	2,024
Lomer, Rohr & Co.	520
Millar & Co.	295

DESTINATIONS.

Liverpool	1,326
London	743
Hamburg	365
Glasgow	4-5

In General.

Messrs. Parent Bros., Montreal, will sell by auction on 15th Novem'ber, a large number of phosphate lots making a total area of 5,000 acres, in the township of Portland West, the property of "La Compagnie Francaise des Phosphates du Canada."

Du Lievre.

Sir John Johnstone and Mr. W. W. Pickford (of Pickford and Winkfield, of London, Eng.) paid a visit during the month to the Little Rapids mines and expressed themselves as well pleased with the present appearance of the mines, and the large bodies of ore exposed. At present but a small force is employed, principally uncovering new shows and improving the property. 127 tons of high grade, consigned to Pickford & Winkfield, London, were shipped last month.

Latest advices anent the operations at the mines of the Canadian Phosphate Co. are as follows: **STAR HILL**—The west sink of the big pit has been continued by hand and steam drilling through favourable looking pyroxene rock carrying small branches of apatite, and the management are expecting daily an improvement in the yield of phosphate. The last drift has been advanced to the south east, following a good course of phosphate, which holds out very fine and strong. This week's work has been chiefly hand drilling on the head drift, but a new steam drill was set working on the night of the 7th inst., being a little stiff at first and in consequence of the great distance from boiler (about 250 feet) the drill does not attain the duty which it should do, and to rectify this we have to put in a steam pipe of larger diameter. At west drift, now 20 feet, work continues in good phosphate ground and is now well under shelter for winter work. The east drift is also yielding its normal proportion of apatite. **MCANDREW'S NEW OPENING**:—Work has been commenced by derrick and gives much promise of becoming a very important pit in future.—**NEW DUGWAY**: Steady work has been carried on here by a few men and drilling and hoisting by horse derrick. This deposit improves as we uncover the face rock, and the quality and the massive character of the phosphate is the finest I have seen. We shall probably have an important pit here.—**POINTS**: The northwest drift and stopes have been advanced under difficulties, but in splendid phosphate bearing ground during this week, the phosphate making upwards as well as down. With the difficulty to procure miners and hand millers required for advancing the head drift, the steam drill has not been working advantageously. This is a very fine pit, but depreciated little at present by the infiltration of water.—**BEAVER MEADOW**: The surface stripping has commenced on east of this pit by a team and a rough scraper working 1½ days, and labourers are now continuing to remove the overburden of gravel and boulders of which there is about 1 ft. to 7 ft. depth.—**NEW CUT**: Much dead work has been done here but the new ground opened up justifies our former good opinion and stopes of it. The present small output must not be regarded as a measure of the capacity of this working, since we are purposely leaving the phosphate in the bottom for the present, in preparing the disposition of the quarry for running steam drill more advantageously as soon as we have a machine at our disposal. 4 steam hoists on pits, 2 hoisters on tramways, 5 steam mills in constant operation, etc., may be mentioned as some of the machinery now in operation at the mines. Equipped with new boilers,

etc., the towing capacity of the "River Belle" now gives every satisfaction. A new boarding house, magazine store house, root house, stables and barn, manager's house and offices (which will include a chemical laboratory) are in course of erection and a number of new tenement houses will probably be erected during the winter.

Templeton District.

The North American Phosphate Company, with head offices at Montreal, has recently been formed to acquire and work phosphate lands in the Township of Templeton. The directors are:—Ex-Ald. Dupuis, President; Albert Holden, merchant, Montreal, Vice-President; Arthur Gagnon, financial agent, Montreal, Secretary-Treasurer; R. Prefontaine, Q.C., M.P., Chas. H. Walters, S. Lachance, all of Montreal, Directors; Arthur M. Perkins, Managing Director. The capital is \$18,000. The property includes lots 17 and 18 in the 8th, S½ of 18 and 19 in the 9th, and S½ of 18 and 19 in the 10th. An acre and a half has been stripped, and phosphate is at present being taken out of a small surface pit.

The Templeton and Blanche River Company of Montreal have suspended operations on their property for the present. Mr. Trimble, the managing director, was out at the mines lately taking an inventory of the plant, machinery, etc. We understand an endeavour will be made either to increase the capital stock of the company or to place it on the market.

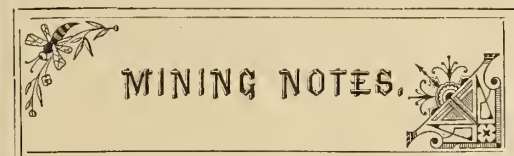
Mr. Jackson Rae's mines are reported to be looking well, and a satisfactory output, with a small force, is being maintained. The new pit is down 40 feet and looks well. 150 tons have been shipped.

The Canada Industrial Company have 120 tons ready for shipment.

The new works at the Blackburn mines are nearing completion. The new cut is nearly through. The management have struck a vein going through, which is yielding largely. At present from 10 to 15 tons of ore per day is being mined.

Perth District.

Messrs. Taylor & Wilcox, of Cleveland, O., are reported to have made a large purchase of phosphate lands near Perth.



We shall be greatly obliged to mine owners and superintendents for such authentic reports of their operations as may concern shareholders and the public.

Nova Scotia.

With the closing of navigation the winter prospects of the Pictou coal mines are not very encouraging, the Springhill mines having secured the lion's share of the government contract, while the Intercolonial, Acadia, and Black Diamond companies have only secured some 15,000 tons each. This quantity will keep the Black Diamond mine pretty well employed as its daily output is small compared with that of the Intercolonial and Acadia Co's. mines.

The shipments from the Drummond have been exceptionally large despite the difficulties the management has had to contend with. It is doubtful whether operations will be continued

at their No. 4 slope during winter as preparatory work must be pushed forward at the New Lift. A little work has been done in the third seam discovered some time ago.

At the Albion every effort is being made to re-open the whole of their valuable mines. The new slope, the scene of the explosion in January last, is being successfully opened up, and the building of the new Bank House is being rapidly pushed forward. One of the engines has been placed in position, and a Dominion Safety boiler is about to be added to the boilers at present in use. At the Vale Colliery the six-foot seam has not been working for some time, but the old slope or "McBean" seam, has been working fairly well, and a new lift is now being sunk there which, when complete, will make that slope 3,000 feet deep.

The seam of coal discovered at Five Islands, Colchester County, and reported in a recent issue, proved to be but a few inches thick but of most excellent quality. Prospecting has been vigorously followed up by Mr. Wilkinson, with the result that he has discovered the outcrop of a larger seam although at the time of writing he had not got it sufficiently opened up to justify him in making a report. It is to be hoped that it will turn out well as the parties interested will spare no expense in development, and will make things "hum" in that part of Colchester County.

Work still keeps brisk at the Gowrie collieries, C. B. A large number of sailing vessels are calling for cargoes and fill up the interval between the arrival of the steamboats. The slack dump is on fire and causing trouble in keeping it from spreading. The shipments of slack have fallen off this year. Though the coke ovens consume large quantities there is scarcely room for the large quantity at present banked.

The reported sale of the Amherst coal property has no foundation in fact, and its announcement in the columns of the local newspapers has caused much annoyance to the parties interested.

From the prospectus of the Colchester Coal Mining Co. (Limited), which has been formed provisionally with a view to testing and developing what is believed to be a valuable coal deposit near Onslow, about eight miles from Truro, we learn that the following are the provisional directors:—Wm. S. Muir, M.D., of Truro, M.D., President; D. J. Thomas, Esq., Gardiner Clish, Esq., Capt. Edward Archibald, of Truro, N.S., and E. A. Charters, of Sussex, N.B. The Solicitors of the company are Messrs. Longworth and Layton, of Truro, and Secretary-Treasurer, Mr. George Ross, of Truro. The company is formed with a capital of \$50,000 in 1,000 shares of \$50 each, and 200 shares of the Treasury Stock are set aside for sale as special or preference shares to raise the required amount for prospecting and development. These shares, \$50 each, are given to first subscribers at \$20 in four instalments of \$5 each, and the first payment of \$5 when the share is taken, and remaining calls if required at regular intervals thereafter at the instance of the provisional directors.

At the Springhill mines, the company are putting down two bore holes, between five and six hundred feet, at the back of North slope,—a six inch and a two inch hole,—for the pur-

pose of sinking another "lift." They intend to place an engine on the top and run a hoisting rope down the larger hole, and the smaller one for a rafter wire. This will do away with sending steam down the pit, thereby keeping the roof good and strong.

A meeting of the shareholders of the Londonderry Iron Company has been held in the office of Messrs. Gillespie, Patterson & Co., Montreal, at which the provisional directors submitted their report. The following board of directors was elected:—Sir George Stephen, Bart., Hon. Donald McInnes, Messrs. A. T. Patterson, John Turnbull, James A. Gillespie, Sir Charles Tennant, Bart., and A. McClelland, the latter two gentlemen being of Glasgow, Scotland.

The last clean up of ten days' crushing at the mill of the Malega Mining Company has resulted in a brick of 250 ounces, worth \$5,000. The result of the first clean up after 23½ days' crushing, was 450 ounces, the yield of 350 tons of ore.

Forty-five tons of quartz crushed on the Withrow property, South Rawdon, have yielded 93¾ ounces of gold.

An important discovery of bituminous coal is reported to have been made at a point eight miles north of the mouth of Diligent River, Parsboro.

350 ounces of gold valued at \$7,000 is given as the result of 16 days' crushing at the mill of Northup mine, Central Rawdon.

The returns from Sherbrooke were 56¾ oz. gold from 255 tons crushed.

The Egerton Gold Mining Co. returns for September 79 oz. of gold from 200 tons quartz crushed.

M. T. Foster, C. Perkins, and others, have bonded the property at West Caledonia, owned by Messrs. Parker and Ford, and are now prospecting it under the supervision of Mr. LeClair. Extremely rich boulders were found on this property last season. Mr. LeClair, although much hindered in his efforts by the excessive rains and depth of surface, has found several promising leads.—*Critic*.

Reports received just as we go to press announce that No. 4 slope at the Drummond coleries have shut down for the winter, the last steamer leaving with cargo for Montreal, on 18th instant.

The following are the gold returns so far received at the Mines Office for September:—

District	Mill.	Tons crushed.	Ozs. Gold.
Sherbrooke		255	56¾
Darrs Hill		850	224
Caribou		120	44½
S. Uniacke		45	43¾
Whiteburn		35	119½
15 Mile Stream		200	79
Stormont		15	18½
Kempt		4	3½
Wine Harbour		75	45¾
Central Rawdon			
Co.		80	364
Lake Catcha		128½	103½
Oldham		116	101

Ontario.

Port Arthur District.

There has been quite a rush of explorers, prospectors, &c., during the past month to secure all that could be located before snow falls, when such work cannot be carried on to advantage. The principal surveys are along the Silver belt north of Whitefish and Arrow Lakes along the projected railway route. The greater portion of the surveys were for Americans, chiefly from Minnesota, who are now fairly well convinced that the rich silver region does not cross the boundary into their state.

The Silver Mountain "West End" mine has got its new hoisting and pumping apparatus in good shape and is making a grand shewing both in the main shaft and about 1000 feet further east where another shaft has been commenced, and is now down some 20 feet.

The "East End" although showing occasional bunches of rich ore, is looking better than it has for many months past. Work was delayed for a few days at No. 3 shaft by the breaking of the crank of the big hoisting engine. A small shipment of rich ore has just been made to the owners in Liverpool. This mine has recently been visited by some of the shareholders from England, who expressed themselves as well pleased with the outlook.

"Crown Point" mine is still trying to rival its famous rival to the south, the "Shuniah Weachu" mine. Lack of capital still continues, however, a great drawback.

The Beaver Mine was unfortunate in losing by fire their magnificent shaft house &c., on top of the hill. It will probably take a couple of weeks to put things to right again. Advantage can however, be taken of other openings so that work will be carried on pretty much as usual.

The Badger Mine is reported to have realized about \$70,000 from their last shipment of ore to New York, and are still adding to their pile of bonanza ore. It is by far the richest producer at present.

A couple of rich veins have been struck recently, one west of Silver Mountain, and one north of the Beaver Mine, but for obvious reasons cannot be publicly particularized at present.

More iron lands have been taken up in the Thunder Bay district, but nothing will be done in the Rainy River district, until the decision of the Privy Council next month, in the matter of the ownership of Minerals & Timber, which is claimed by both the Dominion and Provincial Governments.

Captain Plummer, lately in charge of the bonanza "Granite Mountain" mine in Nevada, is about to take up his residence in Port Arthur. He is reported to be "well fixed" and eager to try his luck in this district.

Sudbury District.

Mr. Elward D. Peters, of the Canada Copper Company, writes as follows regarding the report of his evidence given before the Ontario Mining Commission, an excerpt of which was reproduced in our last issue:—"The article consists of my answers to some scores of questions, con-

densed into a few paragraphs, and applies rather to the deposits at large scattered throughout the district, than to any special mine, except where so stated. I do not feel at liberty to give the exact grade of the ore mined by the Canada Copper Company, but it certainly varies very considerably from the figures here given, which referred mostly to the entire body of ore as mined from the average undeveloped deposits in this section."

Manitoba and North-West Territories.

Sir A. T. Galt has given notice that he will apply to parliament for an act incorporating "The Alberta Railway and Coal Company," with power to construct and operate a line of railway from the railway of "The Northwestern Coal and Navigation Company, limited," near Lethbridge, in a southerly direction to the international boundary line; and to connect with the railway of any company in the territory of Montana, and to lease the railway of such company or otherwise to make arrangements for the joint operation of the same, with power to amalgamate with or otherwise acquire the property of "The Northwestern Coal and Navigation Company, limited."

British Columbia.

At a meeting of the Eureka Silver Mining Company, held recently in Victoria, the vacancies on the board of directors were filled up. The new board is constituted as follows: Hon. Hugh Nelson, Hon. John Robson, C.E. Pooley, J. Van Bramer, R. P. Rithet, Wm. Dalby and G. W. Haynes. An effort will be made to reorganize the company and place it on a better basis. The mine is situated on Hope Mountain and is said to be of undoubted richness.

During the month of September the coal shipments from Nanaimo and Wellington amounted to 49,908 tons of coal, being nearly 4,000 tons in excess of the July shipments, which were the highest reached at that time. For custom purposes the coal is valued at \$4 per ton, making a total value of coal exports for September of \$176,000. These shipments do not embrace the coal taken to Vancouver for the use of the China steamers, nor the provincial trade. The coal was exported in twenty-five vessels, the greater bulk going to San Francisco. In addition to the coal shipments, the steamer Ferndale took to the Irondale smelting works at Port Townsend, 1700 tons of Texada Island iron ore for the month of September, the value of the ore for export purposes being \$3 per ton, thus swelling the total by \$5,100.

Correspondence from Donald report a rich discovery of galena, carrying gold and silver at Toby creek. Assays are said to be high.

The Selkirk Mining Company still continue developments on the Lanark, one of their best properties at Illicillewaet.

Mr. R. G. McConnel, of the Geological Survey, has returned to Ottawa from the Yukon country. He states that the mineral prospect along the Liard, below the mouth of the Dease is not encouraging. The old mining camps are, with very few exceptions, deserted and no new ones have taken their places. The mineral resources of the great Slave Lake region he reports indifferent but the supply of petroleum appears to be almost inexhaustible.

The Coalfields of Cape Breton.

By E. Gilpin, Jr., F.G.S., F.R.S.C., Inspector of Mines.

(Continued from September issue)

The following analyses will serve to show the composition of this coal at the Collieries operated on it from Cow Bay to Sydney Harbor:

	Cow- rie.	Cale- donia.	Re- serve.	Lin- gan.
Moisture	.50	.92	.52	.75
Vol. Comb. Matter, slow Coking.....	28.13	28.62	34.21	34.61
Vol. Comb. Matter, fast Coking.....	31.41	30.31	37.60	37.26
Fixed Carbon, slow Coking.....	66.01	64.02	59.73	61.39
Fixed Carbon, fast. Coking.....	62.73	62.33	56.34	58.74
Ash	5.36	6.43	5.54	3.25
Sulphur	2.71	1.10	1.25	1.35
Specific Gravity ...	1.31	1.33	1.28	1.29

The ashes of this coal vary in color from light to deep red.

The gas values of this seam vary from 8,900 to 9,500 cubic feet of gas, of from 13 to 15 candle power, and a good Coke is left.

The following ultimate analysis of the coal from the Reserve mine, made at the Royal School of mines, will prove of interest:

Carbon.....	77.41
Hydrogen	5.47
Nitrogen. }	
Oxygen. }	9.30
Sulphur.....	2.47
Water	1.00
Ash	4.35

The following analysis of the Coke from this mine is from a report of Mr. E. D. Peters, on practical tests made by him in experimental smeltings of Coxheath copper ore, and it may be remarked that a better article would be produced if the manufacture was conducted on a large and systematic scale.

Moisture	1.03
Carbon.....	90.04
Sulphur.....	.70
Phosphoric Acid..	trace
Ash	8.01

The ash of this seam presents the following composition,

	Lingan* Mine.				Reserve Mine.	Caledonia Mine.
	Top.	Middle.	Bottom.	Average.		
Iron Peroxide	35.66	1.57	27.75	21.66	21.810	11.853
Alumina	9.07	6.08	4.91	6.69	8.110	4.206
Silica	43.07	79.06	48.62	57.05	68.330	65.734
Lime	6.13	8.34	11.83	.93	915	7.151
Manganese.....	5.73	3.08	6.52	5.11	480	.950
Sulphuric Acid.....						4.283
Alkalies		.97	.37	.56		2.150
Magnesia	.34				trace	1.260
Phosphoric Acid.....						2.725
Chlorine.....						trace
					99.645	100.306

The following is the composition of the lowest of the seams worked to any extent. The coal is usually compact and lustrous with fine laminae. Some specimens show mineral charcoal, while others are free from it.

	S	South Head.	Emery.	†Collins.
Moisture	1.767	.65		
Vol. Comb. matter, slow coking	28.000	32.21		
" " " fast	28.833	34.80		
Mixed Carbon, slow coking	62.263	63.49		
" " " fast	61.430	60.90		
Ash	7.970	3.65		
Sulphur	2.641	2.41		
Specific gravity...	1.382	1.28		

The ash of this seam, as worked at the Emery Colliery, has the following composition:—

Iron peroxide.....	38.764
Alumina	1.336
Silicious residue.....	50.673
Lime	4.200
Manganese	trace.
Magnesia	1.015
Sulphuric acid.....	4.030
Phosphoric acid.....	.012
Chlorine	decided trace.
Alkalies	do.
	100.030

During the examination of the ash of this coal numerous small rounded quartz pebbles the size of a pea were noticed. The following analysis shows the ultimate composition of the seam as worked at the Schooner Pond Colliery (analyst unknown.)

Carbon	78.10
Hydrogen	5.48
Oxygen and nitrogen	7.81
Sulphur.....	2.49
Water.....	2.67
Ash	3.45
	100.00

The coals from this seam are claimed to be good for steam raising, and to give off less smoke than the overlying coals.

The following analysis will serve to show the character of the best known seams opened below those referred to above.

Tracey seam, of Mira Bay, (analy. Geol. Survey.)

Moisture	22.35
Volatile combustible matter ..	30.09
Fixed carbon ..	66.61
Ash	.98
	99.915

Mullins' seam, south side Sydney Harbor:

	ft.	in.
Coal	2	0
Shale.....	0	4
Coal.....	4	0
	6	4
Volatile matter	31.4	
Fixed carbon	62.4	
Ash	6.2	

This analysis was made some years ago by Dr. Dawson, and he remarks: "This coal has some of the properties of cannel. It has great heating power and yields much dense carbonaceous gas."

In the Glace Bay section, a few feet below the Hub seam, is a bed of cannel coal one foot two inches thick lying on nine inches of ordinary

bituminous coal. The following analysis was made by Dr. How:

Moisture	.83
Volatile combustible matter.	30.07
Fixed carbon.....	44.42
Ash	24.68
	100.00

BROAD COVE DISTRICT.

In the Geological Survey Report for the year 1874, there is a description of the Broad Cove coal field, and a set of analyses made by Dr. Hoffmann, of the Survey, which are given here with his remarks, in a condensed form:

	7 ft.	5 ft.	4 ft.
	Seam.	Seam.	Seam.
Moisture.....	4.02	7.78	8.45
Vol. Comb. Matter, slow Coking	20.17	27.67	28.36
" " " fast " ..	25.39	34.51	36.52
Fixed Carbon slow Coking	70.41	52.87	56.94
" " " fast " ..	65.18	46.03	48.78
Ash	5.40	11.68	6.25

These coals do not soil the fingers. They are black, with pitchy lustre, banded, with uneven fracture. The powder of the five and of the four feet seams when boiled in caustic soda imparts a brown color to the liquid, this with the percentage of water would make them approach in character to brown coal, although they occur in strata of carboniferous age. The coal from the largest seam does not color a solution of caustic soda and is more closely allied with the typical carboniferous coals. Zinc blende was observed as a film in this coal. These coals are said to produce little smoke when burned in marine boilers.

PORT HOOD DISTRICT.

As yet but little mining has been done here, and the qualities of the coals have not been settled by practical experience. The Geological Survey Report, 1876-77, page 469, gives a report on the coal of the lower or 7 feet seam.

It appears to resemble in its general characteristics the Broad Cove coal, and yielded on analysis:—

	Fast	Slow.
	Coking.	Coking.
Moisture	4.02	4.02
Volatile combustible matter	38.81	34.86
Fixed carbon	49.65	53.60
Ash (purplish red).....	7.52	7.52

The coal is said to contain rather above the percentage of sulphur usually found in Cape Breton coals.

I have no analysis of the Chimney Corner coals. They are not as bright as many of the eastern coals, but are good steam coals.

Reference has been already made to the area of millstone grit extending from Sydney up the valleys of the Mira and Salmon Rivers. These measures show several outcrops of coal beds apparently underlying large tracts of country.

The beds are known only by natural outcrops, and no attempt has been made to ascertain if other beds are present. They do not exceed two feet in thickness, and, as the route of the Cape Breton railway will not follow these rivers as was expected at one time, they will probably not receive any attention for many years to come.

The following analysis is from the Canadian Geological Survey:—

Moisture	1.53
Volatile combustible matter....	20.16
Fixed carbon.....	47.49
Ash	30.82
	100.00

At other points the coal is reported by Mr. Fletcher as yielding an inconsiderable amount of ash. Another outcrop of coal in this district is interesting, as it presents in the Lower Carboniferous conglomerate the evidences of an origin identical with that of the more important seams of the productive measures. It yielded.

Volatile combustible matter...	17.80
Fixed carbon.....	29.04
Ash.....	53.16

About eight miles from Baddeck, at Hunter's Mountain, is an outcrop of coal similar in composition and mode of occurrence to that just mentioned. The coal is irregular, varying in thickness from a few inches to two feet. It is divided by numerous cleavage planes, sometimes coated with galena.

At East Bay, in the marine limestones and marls, pockets occur holding calc and fluor spar and patches of bright cubical coal yielding on analysis;

Volatile matter.....	36.72
Fixed Carbon.....	46.64
Ash.....	16.64
	100.00

For comparison with the seams of coal of economic value the following analysis of coal from a fossil carbonized tree in millstone grit measures in the same district may prove interesting:

Volatile matter.....	34.9
Fixed Carbon.....	59.9
Ash.....	5.2
	100.0

Coke firm and vesicular.

Some years ago a good deal of interest was aroused by a statement that active work was being performed on a seam of anthracite coal at McAdam's Lake, near the head of East Bay. The bed occurred in red and gray shales and conglomerates of the lowest division of the Carboniferous. It, however, proved to be little more than a coaly shale, lustrous and resembling the poorer anthracite coals of the United States. On analysis it yielded:-

Volatile Matter.....	17.80
Fixed Carbon.....	29.04
Ash.....	53.16
	100.00

Notwithstanding the large amount of ash the coal yielded a firm and porous coke.

Irregular pockets and beds, or rather seams, of hard compact coal are frequently found in the carboniferous of this Province. The mineral frequently breaks irregularly, does not soil the fingers, and resembles anthracite. On a closer examination however these coals are found to be either highly carbonaceous shales, or compact semi-anthracite coal—its more volatile ingredients being lowered in amount by the hardening, etc., the containing strata have undergone. Considerable sums of money have been spent in testing and prospecting these deposits, but so far the results have not been at all satisfactory.

RIVER INHABITANTS COAL DISTRICT.

I am not aware of any recent analysis of the coals of this district. Little systematic mining has been carried on for a number of years, and the writer is obliged, like Mr. Fletcher, to refer to the report made a number of years ago by Dr. Dawson to the Government of Nova Scotia.

He gives the following analysis of the Little River four feet seam:—

Volatile matter.....	30.25
Fixed carbon.....	56.40
Ash.....	13.35
	100.00

and remarks that it is more bituminous than the Sydney or Pictou coals, and should prove practically a good domestic and gas coal.

He also gives the following analysis of the eleven-feet seam found at Sea Coal Bay:—

Volatile matter.....	25.2
Fixed carbon.....	44.7
Ash.....	30.1
	100.00

The amount of ash given in this analysis would make the coal of little use for ordinary purposes. I am informed, however, by parties interested, that it by no means yields this large percentage of ash, and that the other seams are apparently of excellent quality. These beds are very well situated, as the harbor remains open all winter, and they will no doubt be re-opened whenever the conditions of the coal trade hold out more promising inducements to the miner. I have no analysis of the coal found at the head waters of the inhabitants river.

From the analysis I have given it will be seen that the island of Cape Breton furnishes Coals adapted for every purpose. They are largely used for steam raising in locomotive and marine boilers, and as their qualities become better known they will be a favorite railway fuel. For gas making and domestic purposes they have established a good reputation. In connection with the various schemes mooted for iron and copper smelting in Cape Breton it is encouraging to note that practical tests have shown that an excellent coke can be made from them. At present the low price obtainable for coal, and the presence of large mines in the eastern district, will operate against developments in other parts of the Island. But it is to be hoped that the discovery of metallic deposits in the districts surrounding the western and southern coal beds may lead to the erection of works drawing their fuel from local sources, and the projected railway from the line of the Sydney and Hawkesbury Railway to Broad Cove will give this part of the island an outlet to good shipping ports.

Foreign Mining Laws.

Arthur Strauss,†

As there has been recently a good deal of discussion about amending the mining laws, and more particularly the laws relating to mine leases, I think the time opportune to lay before you some peculiarities of the Foreign Mining Laws. You will find that many of them, although they may work well in other countries, are totally inapplicable to this country, but you will notice some which may with advantage be adopted or assimilated here. I purposely shall endeavour to make as few comments as possible but simply put the plain facts before you; for with the present agitation going on, I am anxious not to say in this institute, devoted to science and research, anything that might savor of political bias. I must leave you to draw your own conclusions and confine myself simply to the act of giving you the materials where-with you may form your own opinions. It would naturally take too long to give you the full details of the mining laws in fore-

ign countries. I shall therefore content myself in pointing out to you the material differences, and while briefly referring to all countries, shall particularly dwell on the German law, for the German law is the most complete, and almost in every particular different to the English. It therefore affords the greatest features of interest and study. In speaking of the laws of a country, I shall also take the rule and not the exception; for almost in every part of Europe we find certain provinces which do not share the general law of the land, and in order to put some system into my address, I shall try to direct your attention step by step to the position of adventurers to landlords, adventurers amongst themselves, adventurers to miners, and lastly, miners amongst themselves.

The basis of the German law is free mining, that is to say the minerals belong to the nation, or, as others explain it, are things without an owner, and everybody has a right to dig for minerals anywhere, subject to certain restrictions which will be fully discussed hereafter. This principle of free mining can already be found in the Roman law, where it prevailed in some provinces. I beg to refer you to the collection of imperial edicts under Emperor Theodosius, in the year 438. There is an edict under Emperor Constantine of the year 320, to the Consul of Africa, giving permission to all men to dig for ores wherever they please. In the year 363, under Julian, this was extended to the whole of the orient, and in the year 376 to other provinces. In the year 382 there is an edict that all miners have to pay one-tenth to the state and one-tenth to the original landlord, while the most curious edict is of the year 393, showing that even then mining laws could be abused, unless carefully drawn up. The order runs thus: "We have been informed that certain people, under the pretence of digging for ores, sink deep shafts for the purpose of damaging the foundation of other people's houses. Therefore, in future, permission will be refused to dig for ores under buildings, so as to prevent the practice of forcing the owner to sell his house cheap, on the pretence of a discovery of mineral wealth under the same, and thus abuse a law made for the common weal, to the detriment of another man's property." The general rule, however, in the Roman law was, that the mines belonged to the Crown, and were let out to the miners for a high royalty.

In England, as you are aware, the maxim of the law is that the soil belongs to the owner to an indefinite extent, upwards and downwards, whatever is in a direct line between the surface of any land and the centre of the earth. He therefore, who is entitled to the soil, is, according to this doctrine, also entitled to the minerals beneath the soil. But when, as it sometimes happens, the title to minerals is distinct from that of the soil, and vested in different persons, the owner of the minerals would *prima facie*, have no right to interfere with the surface, but the English law invariably accompanies a right to property with the necessary means for its enjoyment, and upon this principle the right to mines implies a right to work them and to the use of as much of the surface of the land as may be necessary for the purpose of effectually carrying on mining operations. We have evidence from the year 1198, in a document which is still in existence and in perfect preservation, among the records of the Exchequer, that the Cornish miners enjoyed certain rights and privileges, and in the remarkable charter of 1305, under Edward I., the ancient franchises and liberties of the tanners were confirmed. They consisted

chiefly of freedom from personal molestation and from servile obligations, exemption from the jurisdiction of other courts in all matters as between themselves and as between themselves and strangers, together with an extensive liberty of mining according to ancient custom. The earliest reliable proof, however, of the ancient custom of tin bounding is the charter of King John, granted by that monarch in the third year of his reign (1202) to the tanners of Cornwall. This custom, which approaches free mining very closely, was confirmed by all the Stannary Parliaments held since; the latest in the 26th or 27th year in the reign of George II., and has not been revoked by any acts of parliament since; on the contrary, we find it repeatedly confirmed. Through the scarcity of wastrel land it has, however, become more or less obsolete. Lord Brougham as counsel for the plaintiff in *Rowe v. Brenton*, is reported to have explained the ancient custom of tin bounding in the following manner: "That the miners had a right to go upon the lord's or the freeholder's tenement, and cut bounds, that is to say, to cut up a turf so as to form a mark upon the surface or area of the soil, which those people called bounds. The miner then, at the Stannary court gave notice to the lord, that if the lord would not work the tin mines under these bounds, he, the miner who proposed to do so, claimed the privilege. Accordingly, this notice was given in three successive courts, according to the usage of the Stannary laws passed, and if at those three courts, the lord, who had the first right to work the tin mines under his soil, would not work them, the miner, through that process, acquired a right as against the lord, and that is what is commonly called bounds." A clear description of the custom was also given by Lord Deuman, in the case of *Rogers v. Brenton*. His Lordship said: "There can be no doubt that this is most remarkable, fulfilling every requisite of good custom. In substance it is this: The mine is parcel of the soil, but it is a parcel which to discover and bring to the surface may ordinarily require capital, skill, enterprise, and combination, which, while in the bowels of the earth, is wholly useless to the owner as well as to the public, the bringing of which into the market is eminently for the benefit of the public. If, therefore, the owner of the soil cannot or will not do this for himself, he shall not be allowed to lock it up from the public, and therefore, in such case (unless when by enclosure he may seem to have devoted the land to other important purposes inconsistent with mining operations), any tinner, i.e. any man employing himself in tin mining, may secure to himself the right to dig the minerals under the land, rendering a certain portion of the produce to the owner of the soil." The idea of the minerals belonging to the public and not to the individual underlies this definition. It is not my province to go further into this ancient custom of tin bounding, to which reference is only made here to show that the spirit of free mining, as will be unfolded to you presently, seems to have pervaded Cornwall from very remote times up to the present moment. The oldest document still extant in Germany which proves the ancient right of free mining, is dated 24th March, 1185—a contract between Bishop Albrecht, of Trent and the miners, and it has prevailed there ever since, until the last general law, passed in the year 1865, fully confirms and particularises it. Though I purposely refrain from giving any opinion upon free mining, I am entitled to give you an interesting discussion which took place in the French Chamber of 1791. A commission was appointed to enquire into the mining laws,

and in the sitting of 20th March, 1791, the Deputy Regnould D'Epeney brought in the new law which embodied free mining, and recommended it in a speech of which the following is an extract:—

"Landed property was originally created through a general division or through labour, and it is clear that the object of such a division could only be to give food to individuals and their cattle.

This division could not possibly have reference to minerals which were hidden in the earth, and not discovered till long after the State was established, for their necessity and value were yet unknown. If the thus acquired property did not refer to minerals, the existence of which was undiscovered, thus evidently they were not included in the division, and if undivided, what is the result? You must perceive that these minerals never had an owner, that therefore they remain a property of the nation, and therefore every nation has the right to dispose of them. As it is further admitted that the minerals are situated in the earth in such a way that they never or but seldom correspond to a single property, they cannot possibly be a complement to a single property, they must rather be taken as everybody's property, they are at the disposal of the nation, for it is certain that such things as have no owner belong to the nation. According to this principle nobody may call himself the owner of the mine, nobody can have any right to a mine but such as the nation concedes to him." To this Humboldt Lamerville made a spirited reply on the following day:—"He contended:—"The nation would become a caretaker instead of an impartial sovereign. It is one thing to subject an entire property to the common weal, and another to make a property uninhabitable and sacrifice it to the common weal. The nation may take all my property against payment if they deem it useful, but let it not in a dangerous manner assert itself as my co-proprietor in one and the same property, by taking the minerals and leaving the surface to me. The State has only once recognized the right of the first occupier, that is, when society was established; the State has no right to alter my legal holdings now. Moreover, the miners who would covet the same deposit of minerals would be led to dispute and strife. It is enough that the scourge of war should be spread on the surface of the globe, surely you don't want the terrible scourge of a subterranean war, which could hardly be pacified by the sword of the law. By conceding to the discoverer the right of the property, you do not help the poor, you would create discord among the rich and foment new disputes."

The famous Mirabeau concluded the debate by a memorable speech on the same day:—"He said: "Society, in its first stage, permitted the attainment of landed property for the purpose of agriculture, building, and for that purpose only the surface was given. The original proprietary right could not possibly refer to minerals 1,200 feet deep. They cannot be a complement to the soil, and are moreover, by their course, unfit to be concluded in the partition of the surface." He then pointed out how difficult it is to get a proprietor to go to the expense of working a mine, for, after all, he may find the true vein under his neighbor's property. He further argued that the proprietor seldom has the capital to work a mine, and that adventurers experience sufficient difficulty to defray the expenses of working without paying any extraordinary value for the land, and concludes that, if you give the landowners the right of the minerals,

the mining industry would suffer and come to a speedy end. The Act was consequently passed on 28th July, 1791. We now come to the German Law. It distinctly states that owners of property have no right to the minerals, and there are heavy fines or imprisonment against the appropriation of minerals, even on your own property. The French Law expresses it differently, but it comes to the same thing. It says: "The moment the concession of a mine is granted, that mine property is distinct from the surface, and is considered a new property. Everybody has a right to dig for minerals, except under streets, railways, and churchyards. It is allowed to dig on other people's property, except under their buildings, or within 200 feet thereof. The owner's permission is requisite, but should he refuse it, the Mining Courts force him to grant it, unless he can show good reasons to the public safety for refusing his permission. Should the forbidden area of 200 feet within his building not be situated in his own property, he has no right of interference. The digger is bound, if required, to pay yearly in advance any damage that may accrue, and to return to the owner the ground after he has finished with it, paying him the depreciation in value. The landlord may demand security for depreciation in advance. In case of dispute about damage, the mining authorities have to settle the amount without appeal. Having discovered the minerals, the miner has to apply to the Mining Court for a concession. The application is advertised in the official newspapers. The demand note has to state the exact hour when it was handed in, and must contain the petitioner's name, a description of the mineral for which the concession is asked, a description of the land required, and the name of the mine. The concession is granted provided the minerals are found really to exist, and provided no other parties can claim a prior right. A new concession for an abandoned mine is granted without inspection, unless it is notorious that that the abandonment was owing to the mine being worked out. The moment a concession is asked for, it is plainly marked on the official map, which is open to the inspection of the public. Should several demands for concessions be handed in simultaneously, then the landlord, if one of the claimants, has the prior right, barring him, the man who regularly explored the ground has the preference to the man who discovered the mineral by mere chance. The adventurers, for we may now call so the parties who have obtained the concession, are bound to work the mine if, by their not doing so, the public interest is endangered. The mine has to be worked according to a working plan, which has to be submitted for approval to the mining authorities. Objection is only raised if the working is considered insecure. The adventurers may, however, appeal to the Board of Trade if they consider the objections ungrounded. Should the original plan be changed, such change to be notified to the authorities. If a mine is worked contrary to the approved plans, the authorities may fine the adventurers, or have power to close the mine. The mine may only be worked under the management of duly qualified persons. The managers' names must be submitted to the mining authorities, who make them pass an examination before qualifying them. The managers are personally responsible for working the mine according to the plans handed in, and for all other rules and regulations which exist as regards the working of mines, safety of boilers, etc., etc., and are fined for any transgression. The royalty in Germany is 2 per cent. to the Government, but

nothing on iron, as it was found that even such a small royalty on iron might impede the industry. In *France* free mining is likewise of ancient date, and included a general liberty of search in all uncultivated places, and a right to work mines whenever the owner, after distinct notice, delayed for three months to work them himself. Such are the prominent features of the various edicts, until the law of 28th July, 1796, the discussion on which has been mentioned before, declared that the mineral wealth of France below the depth of 100 feet was the property of the nation, to be disposed of by the Government in the general interest of the public, and unfettered by any claim from the owner of the soil, who, however, was entitled to preference. The law of 21st April, 1810, declares the property in mines to be distant from the soil, which cannot be explored without a concession of the Government. According to this law, the French Government has a right to grant the concession to whomsoever it pleases, and acknowledges no right of preference in the owner of the soil, or the first discoverer of the minerals, but the first discoverer has, nevertheless, a claim upon the consideration and good will of the Government. The mine owner has to pay double the usual rent for the surface property required, and double the amount of real damage done to the landowner. If the works should deprive the landowner of the use of his ground for more than a year, or unfit it permanently for cultivation, the explorer must buy the plot, for a sum not to exceed double its value, before the occupation. The royalty in France may change every year, but is not allowed to exceed, and generally amounts to, 5 per cent. of the net produce of the mine, to be paid to the State. Over and above, however, the government makes an additional charge of 10 per cent. to form a relief fund for accidents.

The law of *Belgium* closely resembles that of France, but by a law of 2nd May, 1837, a preference is given to the proprietor of the soil to have the first concession for exploring minerals situate under his own land; but two conditions are attached to this preference: First, that the proprietor satisfies the mining authorities that he possesses the necessary funds for exploring the mines and carrying on the undertaking; the other, that the land can be profitably worked. It also differs from the French law, in so far as the latter does not allow any shaft to be sunk within 300 feet of an habitation without consent of the owner, while the Belgium law merely confirms this, provided the 300 feet are within the owner's land and not in adjacent property. In addition to the 5% royalty to the state, a royalty from one to 3% is paid to the land owner, the mining authorities fixing the exact proportion according to the richness of the mine.

In *Austria* the same free mining exists, and the mining authorities settle the amount of the damage for devastated land. A concession is easily obtained; it is, however, only granted for one year, when it must be renewed and made absolute, after sufficient proof has been given that the researches have been successful. No special royalty is paid either to the landlord or to the state, but the income tax, and particularly the provincial or municipal taxes, are very heavy.

In *Spain* free mining prevails. The concession is granted by the civil governor of the province, after satisfactory proof that the minerals exist. The landowner has to be compensated for the damage, and no shaft may be sunk within 40 yards of any building, or within 1,400 yards of fortified places. The surface

owner has preferential rights, provided he undertakes to commence working within thirty days. The Government royalty is very small, and is levied at so much per acre.

In *Sweden* and *Norway* we also find free mining, but here the owner of the ground is entitled to participate to the extent of one half in the mining and the profit derived thereof. The land required by the mine is valued in proportion to the highest value of other ground in the neighbourhood. No tax is paid for the working of a mine either to the government or any private individual.

In *Italy* there is no universal legislation respecting ownership of mines, but free mining generally prevails, except in sulphur mines, which can only be worked by the owners of the soil. The law of 20th November, 1859, now governs the mining industry in most provinces. Minerals can only be worked by virtue of a government concession, and from the date of the act of concession the mineral ownership becomes distinct from the ownership of the soil. The concession does not exceed two, or at furthest three years, and may be at any time revoked in case of the suspension of working. Questions of priority, or of property, between contending applicants, are decided by the ordinary tribunals. The royalty payable to the state is generally 5% of the net produce of the minerals. This tax may be converted for a definite period into a fixed annual tax. The government may remit, in whole or part, the tax payable, in case of heavy expenditure, extraordinary work, or on account of damage suffered from accident, not imputable to negligence.

It would be impossible to go here into the laws in force in the *United States*, owing to the numerous statutes and mining regulations existing in the different districts, often inaccessible, and, more frequently, various, indefinite, and conflicting. For instance, there are not less than 500 mining districts in California, 200 in Nevada, and 100 each in Arizona, Idaho, and Oregon, each with its set of written regulations. The main objects of the regulations are to fix the boundaries of the district, the size of the claims, the manner in which claims shall be marked and recorded, the amount of work which must be done to secure the title, and the circumstances under which the claim is considered abandoned and open to occupation by new claimants. The right of private ownership in minerals extracted from the soil is recognized in nearly all the States and Territories. All such minerals belong to the owner of the land, and the government claims no royalty.

We thus find in nearly all European States, free mining, and I must not omit to mention that the miners have the same right and claim on watercourses, roads, and other matters necessary for their industry, as they have on the land.

Throughout the Continent mines are worked either by individuals or by ordinary limited liability companies, as the system of unlimited companies is almost entirely unknown there. If more capital is required it is generally raised by further issue of shares or by debentures.

In Germany, however, we find a system very similar to our cost book system, and just because it is similar but not identical, it is interesting to study wherein it differs. The adventurers there can make their own articles of association and regulations, which, however, must be confirmed by the holders of at least 75% of the shares. The object of having such a large percentage is thoroughly to protect the minority, and to prevent a few large shareholders taking

advantage of their position at the cost of the minority. Adventurers are bound to pay their share of the cost, and of the liabilities incurred in proportion to their shares. Creditors of a mine can only levy distress on the property of the mine, but have no claim against individual adventurers. You have, therefore, this difference that each adventurer can only be made to pay his original share of the liabilities, and not his partner's share, should the latter be unable to fulfil his engagements; at the same time the management cannot commit the adventurers unto very extensive liabilities, as creditors, knowing they have only the machinery and other moveable assets to look to, are careful in their dealings. As a rule, there are either 100 or 1,000 shares, which may, however, be subdivided into tenth parts. A certificate is issued, but the shares cannot be transferred without a return of the certificate. At a general meeting each share has a vote. No voting can take place unless the invitation to the meeting distinctly stated the object on which a vote may be taken; simple majority decides, but more than half the number of shares must be represented at the meeting. Should such a number not be present, another meeting must be convened, which may then finally decide, irrespective of the number present. A majority of at least 75% of all shares, however, is necessary for any vital decision, such as the sale of the mine, consolidation, or liquidation. Any shareholder has a right to appeal against the resolution of the shareholders in the ordinary tribunals, on the plea that the resolution is not to the real advantage of the body of adventurers. While the decision of the tribunals is pending, the resolution of the meeting may be duly carried out without responsibility to anybody, but if the plea is properly made out, the tribunal may rescind the decision. As you are aware, such an interference of the tribunals in the decision of a company, even if in accordance with their own by-laws, is not at all rare in this country, for you constantly find the Court of Chancery interfering in arbitrary decisions of club committees, even if the aggrieved member is bound by the rules of the club to submit to such a decision. The adventurers are bound to name to the mining authorities one or two persons, who represent the company in all judicial and other matters. These representatives, corresponding to a committee here, are bound to see that the books are properly kept, and to show them to every adventurer at any time he may require. This committee has to call a general meeting at least once a year, or at any other time, if asked to do so by shareholders representing 25% of the shares. Adventurers are liable for any responsibilities incurred by the committee in the name of the mine, and the committee themselves are free from all personal liability in the matter, unless they exceed their authority. Shares may be abandoned as here, and the adventurers may, as here, either sell the abandoned shares or retain them. The mine can only issue special rules for the workmen, which are not in conformity with the law of the land, such as the imposition of fines, etc., with the approval of the mining authorities. Unless specially arranged before hand to the contrary, a fortnight's notice to quit must be given, either by employee or employed. Miners can only be dismissed without notice, or before the specially arranged contract expires:—

1. For theft, embezzlement, repeated drunkenness, gross disobedience, or continued obstinacy.

2. For acting contrary to the rules laid down by the mining authorities for the working of the mine.

3. For actual violence or verbal abuse of their superiors.

4. If incapacitated for work, or inflicted with an infectious disease.

Miners are allowed to leave without notice :—

1. If they are physically incapacitated to do their work.

2. If actual violence has been used against them by their employers.

3. If they do not receive the promised or contracted wages.

The employer is bound to give a character to a leaving miner, and should any accusation be made therein, the miner has a right to have the matter examined by the mining authorities. Employers are not allowed to engage miners who have previously worked in other mines without inspecting their character.

Then we have the usual strict regulations with regard to employment of children, which are the same for mines as for all other manufacturing.

Employers are bound to pay the miners in cash, and not in goods. They may, however, supply the miners, in deduction of their wages, and with the consent of the miners, with housing, fuel, food, and the necessary tools. A list of miners employed, with full particulars, must be kept in the counting-house, open for inspection to the mining authorities. The law makes Friendly Societies amongst the miners compulsory. These Friendly Societies may embrace other workmen in the neighboring districts, with the consent of the mine owners or adventurers, for this term is now synonymous. Clerks, managers, and all other employees, are admitted in these miners' Friendly Societies. The mine owners, together with properly chosen delegates of the miners, have to draw up the rules and regulations of these Friendly Societies. These rules must be approved by the mining authorities, who may only interfere if they contain provisions contrary to the general law of the land.

The miners may become full members if—

1. They have been members for a certain specified period.

2. They are not beyond a certain specified age.

3. They are free from all sickness, which presumes that they were invalids before joining.

After being full members they are entitled—

1. In case of illness to free doctor and medicine; they are not allowed to choose the doctor themselves, but must accept the doctor of the Society.

2. A sick allowance during the time of illness, provided their illness is not caused by a gross negligence of their own. The allowance lasts for thirteen weeks, after which time, if not cured, they receive the ordinary allowance of invalids.

3. An allowance for cost of burial.

4. An allowance as invalids during lifetime, unless they are incapacitated through gross negligence of their own. This allowance is, however, stopped as soon as the miner is fit for work again, and the convalescent invalid is bound to take any work which his physical capacity allows him to execute.

5. A pension to the widow for life, unless she marries again.

6. Support for the education of children of deceased members and invalids up to their fourteenth year.

Members who are not full members are entitled only to doctor, medicine, and sick allowance; further, to costs of burial and invalids pensions, in case of accident while at work. Either a single mine, or several mines combined, may have these Friendly Societies, and the

allowances are to be decided by the committee of these Societies.

The allowance cannot be transferred by the recipient to third parties, nor can they be put a stop to by legal process. Both the mine owners and the miners have to contribute to the societies. The contributions of the miners may be regulated either in proportion to their wages, or a corresponding fixed sum. Mine owners must contribute at least 50% of the amount paid by the miners in their employ. The mine owners are bound to see to it that the miners pay their contribution, otherwise they are made themselves responsible for the deficiency; they are bound to supply the Friendly Society with a list of the men in their employ. The committee consists of a certain number, to be fixed by the Society; half are chosen by the mine owners, and the other half by the miners. The committee is bound to look to the proper execution of the rules, and has the care of the money, and chooses doctors, chemists, etc. The committee is under the supervision of the mining courts, who send an inspector to every meeting to watch over their proceedings. The committee may, instead of supplying such patient who has a family with doctor and medicine, send him to the hospital, with his consent, or even without his consent, if in their opinion proper care cannot be bestowed upon him in his own home, and patients without a family they may send to the hospital in any case.

If a man with a family is sent to the hospital, and the family is dependent on his earnings, half the usual sick money must be paid to his family. The usual allowances are, during time of sickness, a labourer's ordinary wages as customary in the district; two-thirds of ordinary wages for invalids; in case of death, 20 day's ordinary wages for burial expenses; for the widow 20 per cent, for each child under fifteen, an additional 15 per cent, and if the child loses its mother 20 per cent of the ordinary day wages. For such incapacitated persons as have been dependent on the workman during his lifetime, 20 per cent of his wages until he or she is no longer in need of such support. Power is given to the committee to impose fines upon their members if they are guilty of any transgression of their rules, necessarily imposed for the purpose of securing safety to human life.

You will see the rules of these compulsory Friendly Societies differ materially from the ordinary English Friendly Societies, and I hope to have an early opportunity of explaining to the mining community the usages in force in the voluntary English societies.

(To be continued.)

Amber Deposits of the Baltic.—It is a somewhat peculiar geological fact that the only place in which amber deposits are known to exist in payable quantities is in the head of the Baltic Sea. It has been ascertained that the vent of Amber extends from the west Russian shores of the Baltic to Denmark, Norway and Sweden. Formerly the supply was obtained mainly through the agency of storms which tore up the amber lying at the bottom of the sea and caused it to be thrown on shore. Within the past quarter of a century, however, mechanics have been applied to the pre-existing methods of obtaining amber economically and with despatch. The most profitable strata have been found in the vicinity of Memel, and it is stated that there are now 20 large dredging boats con-

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—BY—

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stantly at work for at least eight hours out of the 24. Further to the west the amber is obtained by divers, who go down with diving apparatus and remain below for four or five hours. Each diver has a little bag round his neck and a peculiar hook, with which he pulls up the sand, and every piece of amber that he finds is thrown into the bag. But that is only one way of obtaining amber. The stratum of green sand in which it is found exists in some places for about 30 miles inland, and the valuable material is mined. In the amber mines there are about 40 miles of passages, while 700 men are employed in the various departments. The miners simply cut the sand and load it in trucks; it is

then brought to the surface where it is thrown into a long trough filled with rushing water, which separates the amber. The latter is caught by nets of various sizes, is then cleaned by machinery, and assorted according to its quality and purity. Although the consumption of amber is considerable, there are few substances for the supply of which mining and dredging operations are required (though it should be borne in mind that amber is not a mineral proper, but a fossil resin) about which so much ignorance prevails.

* Analyst: H. How, † Analyst Professor Chapman.
‡ Read before M. I. of Cornwall.

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2nd.—North half of lot 23, in the 5th range, containing 100 acres.

3rd.—Nine acres of lot No. 28, in the 5th range, with water privileges thereto appertaining, being site of mill dam, etc., etc.

The property formerly belonged to the Montreal Plumbago Mining Company, and was worked successfully for several years, until the company's mill was destroyed by fire, but the mill dam remains almost uninjured, and there are on the property several houses, sheds, etc., built for various purposes when mining operations were carried out.

The Plumbago Deposits

upon the property are regarded as amongst the richest and most extensive in the Dominion. As to the quality of the Plumbago, it has been extensively used in the manufacture of crucibles, lubricating leads, stove polish, etc., etc., and given unbounded satisfaction. This is established by the experience of consumers, and by a certificate from the celebrated Battersca Crucible Works, London, England, a copy of which is open for inspection.

MICA

has also been discovered in quantities.

The lands are in the Phosphate region, and recent prospecting has disclosed a rich and extensive deposit of this mineral. There are unrivalled facilities for transporting the ore to and from the mines by the Ottawa River and C. P. Railway. Distance from mines to Railway Station 6 miles. Good road.

All that is required to make these valuable mines handsomely remunerative is a little capital and enterprise.

The Title is Indisputable.

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Free from Reserves or Royalties.

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the Dominion; also in the United States, the United
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other countries and British Colonies generally.

On Money Orders payable within Canada the
commission is as follows:

If not exceeding \$4	2c.
Over \$4, not exceeding \$10	5c.
" 10, " "	10c.
" 20, " "	20c.
" 40, " "	30c.
" 60, " "	40c.
" 80, " "	50c.

On Money Orders payable abroad the commis-
sion is:

If not exceeding \$10	10c.
Over \$10, not exceeding \$20	20c.
" 20, " "	30c.
" 30, " "	40c.
" 40, " "	50c.

For further information see OFFICIAL POSTAL
GUIDE.

Post Office Department, Ottawa.
15th Sept., 1888.

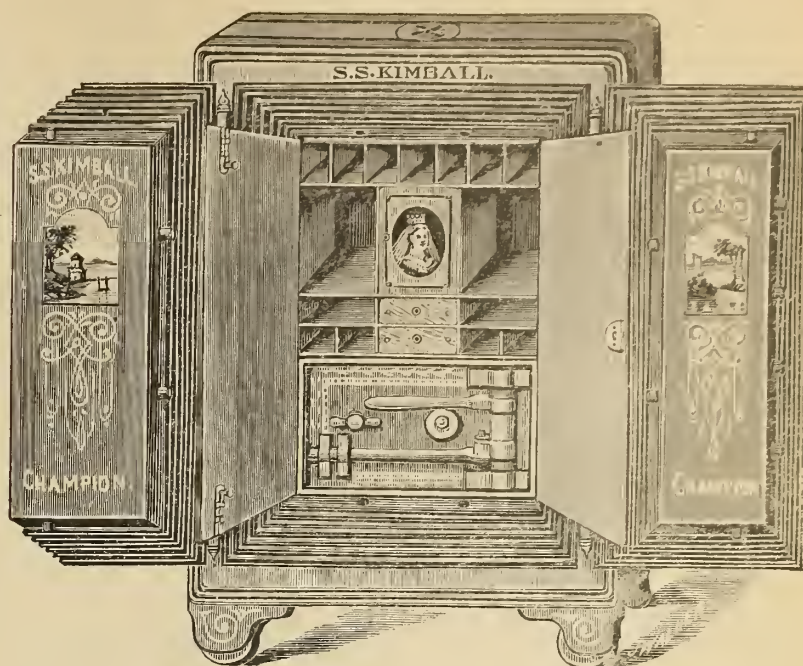
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thirty eight feet. It worked very well indeed, although I was obliged to carry steam 150 feet
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and the Jet Pump took the place of a No. 3 K (\$200 Piston Pump), that I had to remove.

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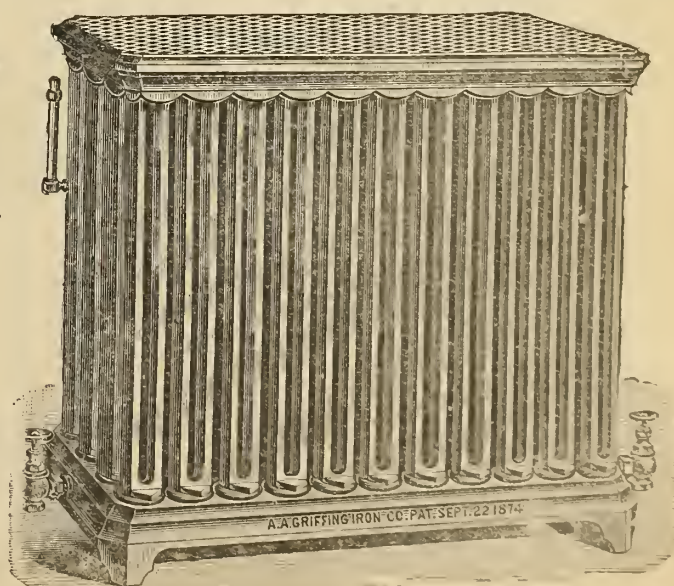
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Department of Inland Revenue.

An Act Respecting Agricultural Fertilizers.

The public is hereby notified that the provisions of the Act respecting AGRICULTURAL FERTILIZERS came into force on the 1st of January, 1886 and that all Fertilizers sold thereafter require to be sold subject to the conditions and restrictions therein contained—the main features of which are as follows:

The expression "fertilizer" means and includes all fertilizers which are sold at more than TEN DOLLARS per ton, and which contains ammonia, or its equivalent of nitrogen, or phosphoric acid.

Every manufacturer or importer of fertilizers for sale, shall, in the course of the month of January in each year, and before offering the same fertilizer for sale, transmit to the Minister of Inland Revenue, carriage paid, a sealed glass jar, containing at least two pounds of the fertilizer manufactured or imported by him, with the certificate of analysis of the same, together with an affidavit setting forth that each jar contains a fair average sample of the fertilizer manufactured or imported by him; and such sample shall be preserved by the Minister of Inland Revenue for the purpose of comparison with any sample of fertilizer which is obtained in the course of the twelve months then next ensuing from such manufacturer or importer, or collected under the provisions of the Adulteration Act, or is transmitted to the chief analyst for analysis.

If the fertilizer is put up in packages, every such package intended for sale or distribution within Canada shall have the manufacturer's certificate of analysis placed upon or securely attached to each package by the manufacturer; if the fertilizer is in bags, it shall be distinctly

stamped or printed upon each bag; if it is in barrels, it shall be either branded, stamped or printed upon the head of each barrel or distinctly printed upon good paper and securely pasted upon the head of each barrel, or upon a tag securely attached to the head of each barrel; if it is in bulk, the manufacturer's certificate shall be produced and a copy given to each purchaser.

No fertilizer shall be sold or offered or exposed for sale unless a certificate of analysis and sample of the same shall have been transmitted to the Minister of Inland Revenue and the provisions of the foregoing sub-section have been complied with.

Every person who sells or offers or exposes for sale any fertilizer, in respect of which the provisions of this Act have not been complied with—or who permits a certificate of analysis to be attached to any package, bag or barrel of such fertilizer, or to be produced to the inspectors to accompany the bill of inspection of such inspector, stating that the fertilizer contains a larger percentage of the constituents mentioned in sub-section No. 11 of the Act than is contained therein—or who sells, offers or exposes for sale any fertilizer purporting to have been inspected, and which does not contain the percentage of constituents mentioned in the next preceding section—or who sells or offers or exposes for sale any fertilizer which does not contain the percentage of constituents mentioned in the manufacturer's certificate accompanying the same, shall be liable in each case to a penalty not exceeding fifty dollars for the first offence, and for each subsequent offence to a penalty not exceeding one hundred dollars. Provided always that deficiency of one *per centum* of the ammonia, or its equivalent of nitrogen, or of the phosphoric acid, claimed to be contained shall not be considered as evidence of fraudulent intent.

The Act passed in the forty-seventh year of Her Majesty's reign, chaptered thirty-seven and entitled, "*An Act to prevent fraud in the manufacture and sale*

of agricultural fertilizers," is by this Act repealed, except in regard to any offence committed against it or any prosecution or other act commenced and not concluded or completed, and any payment of money due in respect of any provision thereof.

A copy of the Act may be obtained upon application to the Department of Inland Revenue, as well as a copy of a Bulletin which it is proposed to issue in April, 1888, concerning the fertilizers

E. MIALL,

15th Dec., 1887. Commissioner.



ONTARIO

Mining Regulations.

The following summary of the principal provisions of the General Mining Act of the Province of Ontario is published for the information of those interested in mining matters in the Algoma District, and that part of the Nipissing District north of the Mattawan River, Lake Nipissing and French River.

Any person or persons may explore for mines or minerals on any Crown Lands surveyed or unsurveyed, not marked or staked out or occupied.

The price of all lands sold as mining locations or as lots in surveyed townships is two dollars per acre cash, the pine timber being reserved to the Crown. Patentees or those claiming under them may cut and use such trees as may be necessary for building, fencing or fuel, or for any other purpose essential to the working of mines.

Mining locations in unsurveyed territory shall be rectangular in shape, and the bearings of the outlines thereof shall be due north and south, and due east and west astronomically, and such locations shall be one of the following dimensions, viz: eighty chains in length by forty chains in width, containing 320 acres, or forty chains square,

containing 160 acres, or forty chains in length by twenty chains in width, containing 80 acres.

All such locations must be surveyed by a Provincial Land Surveyor, and be connected with some known point or boundary at the cost of the applicant, who must file with application surveyor's plan, field notes and description of location applied for.

In all patents for mining locations a reservation of five per cent. of the acreage is made for roads.

Lands patented under the Mining Act are free from all royalties or duties in respect to any ores or minerals thereon, and no reservation or exception of any minerals is made in the patents.

Lands situated south of the Mattawan River, Lake Nipissing and French River are sold under the Mining Act at one dollar per acre cash.

Affidavits showing no adverse occupation, improvement or claim should accompany applications to purchase.

T. B. PARDEE,

Commissioner.

Department of Crown Lands, Toronto.



SEALED TENDERS, addressed to the undersigned and endorsed "Tenders for Addition, etc., to Post Office, at Coburg, Ont.," will be received at this office until Saturday, 10th November, 1888, for the several works required in the erection of an addition, etc., in the Post Office at Coburg, Ont.

Specifications can be seen at the Department of Public Works, Ottawa, and at F. A. Muirson, Law Office, Coburg, on and after Tuesday, 16th October, and tenders will not be considered unless made on the form supplied, and signed by the actual signatures of Tenderers.

An accepted Bank Cheque payable to the order of the Minister of Public Works, equal to 5 per cent. of the amount of the Tender, must accompany each Tender. This cheque will be forfeited if the party decline the contract, or fail to complete the work contracted for, and will be returned in case of non acceptance of tender.

The Department does not bind itself to accept the lowest or any tender.

By Order

A. GOBEIL,

Secretary

Department of Public Works, }
Ottawa, Oct., 11th 1888.

The Polson Iron Works Co'y

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SPECIAL AGENTS FOR

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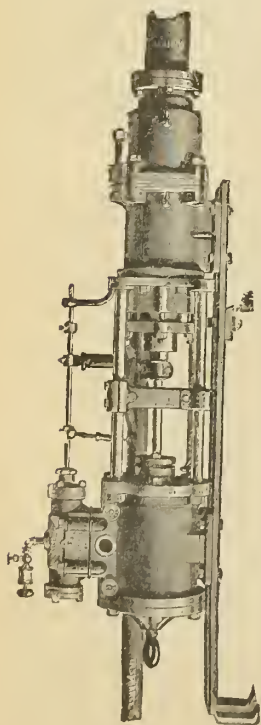
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TORONTO





Mining Regulations

TO GOVERN THE DISPOSAL OF

Mineral Lands other than Coal Lands, 1886.

THESE REGULATIONS shall be applicable to all Dominion Lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, iron or other mineral deposits of economic value, with the exception of coal.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein either by surface or subterranean prospecting for mineral deposits, with a view to obtaining under the Regulations a mining location for the same but no mining location or mining claim shall be granted until the discovery of the vein, lode or deposit of mineral or metal within the limits of the location or claim.

QUARTZ MINING.

A location for mining, except for iron on veins, lodes or ledges of quartz or other rock in place, shall not exceed forty acres in area. Its length shall not be more than three times its breadth and its surface boundary shall be four straight lines, the opposite sides of which shall be parallel, except where prior locations would prevent, in which case it may be of such a shape as may be approved of by the Superintendent of Mining.

Any person having discovered a mineral deposit may obtain a mining location therefor, in the manner set forth in the Regulations which provides for the character of the survey and the marks necessary to designate the location on the ground.

When the location has been marked conformably to the requirements of the Regulations, the claimant shall within sixty days thereafter, file with the local agent in the Dominion Land Office for the district in which the location is situated, a declaration or oath setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as aforesaid; and shall, along with such declaration, pay to the said agent an entry fee of FIVE DOLLARS. The agent's receipt for such fee will be the claimant's authority to enter into possession of the location applied for.

At any time before the expiration of FIVE years from the date of his obtaining the agent's receipt it shall be open to the claimant to purchase the location on filing with the local agent proof that he has expended not less than FIVE HUNDRED DOLLARS in actual mining operations on the same; but the claimant is required, before the expiration of each of the five years, to prove that he has performed not less than ONE HUNDRED DOLLARS' worth of labor during the year in the actual development of his claim, and at the same time obtain a renewal of his location receipt, for which he is required to pay a fee of FIVE DOLLARS.

The price to be paid for a mining location shall be at the rate of FIVE DOLLARS PER ACRE, cash, and the sum of FIFTY DOLLARS extra for the survey of the same.

No more than one mining location shall be granted to any individual claimant upon the same lode or vein.

IRON.

The Minister of the Interior may grant a location for the mining of iron, not exceeding 160 acres in area which shall be bounded by north and south and east and west lines astronomically, and its breadth shall equal its length. Provided that should any person making an application purporting to be for the purpose of

mining iron thus obtain, whether in good faith or fraudulently, possession of a valuable mineral deposit other than iron, his right in such deposit shall be restricted to the area prescribed by the Regulations for other minerals, and the rest of the location shall revert to the Crown for such disposition as the Minister may direct.

The regulations also provide for the manner in which land may be acquired for milling purposes, reduction works or other works incidental to mining operations.

Locations taken up prior to this date may, until the 1st of August, 1886, be re-marked and re-entered in conformity with the Regulations without payment of new fees in cases where no existing interests would thereby be prejudicially affected.

PLACER MINING.

The Regulations laid down in respect to quartz mining shall be applicable to placer mining as far as they relate to entries, entry fees, assignments, marking of localities, agents' receipts, and generally where they can be applied.

The nature and size of placer mining claims are provided for in the Regulations, including bar, dry, bench, creek or hill diggings, and the RIGHTS AND DUTIES OF MINERS are fully set forth.

The Regulations apply also to

BED-ROCK FLUMES, DRAINAGE OF MINES AND DITCHES.

The GENERAL PROVISIONS of the Regulations include the interpretation of expressions used therein; how disputes shall be heard and adjudicated upon; under what circumstances miners shall be entitled to absent themselves from their locations or diggings, etc., etc.

THE SCHEDULE OF MINING REGULATIONS

Contains the forms to be observed in the drawing up of all documents such as:— "Application and affidavit of discoverer of quartz mine." "Receipt for fee paid by applicant for mining location." "Receipt for fee on extension of time for purchase of a mining location." "Patent of a mining location." "Certificate of the assignment of a mining location." "Application for grant for placer mining and affidavit of applicant." "Grant for placer mining." "Certificate of the assignment of a placer mining claim." "Grant to a bed rock flume company." "Grant for drainage." "Grant of right to divert water and construct ditches."

Since the publication, in 1884, of the Mining Regulations to govern the disposal of Dominion Mineral Lands the same have been carefully and thoroughly revised with a view to ensure ample protection to the public interests, and at the same time to encourage the prospector and miner in order that the mineral resources may be made valuable by development.

COPIES OF THE REGULATIONS MAY BE OBTAINED UPON APPLICATION TO THE DEPARTMENT OF THE INTERIOR.

A. M. BURGESS,

Deputy Minister of the Interior.

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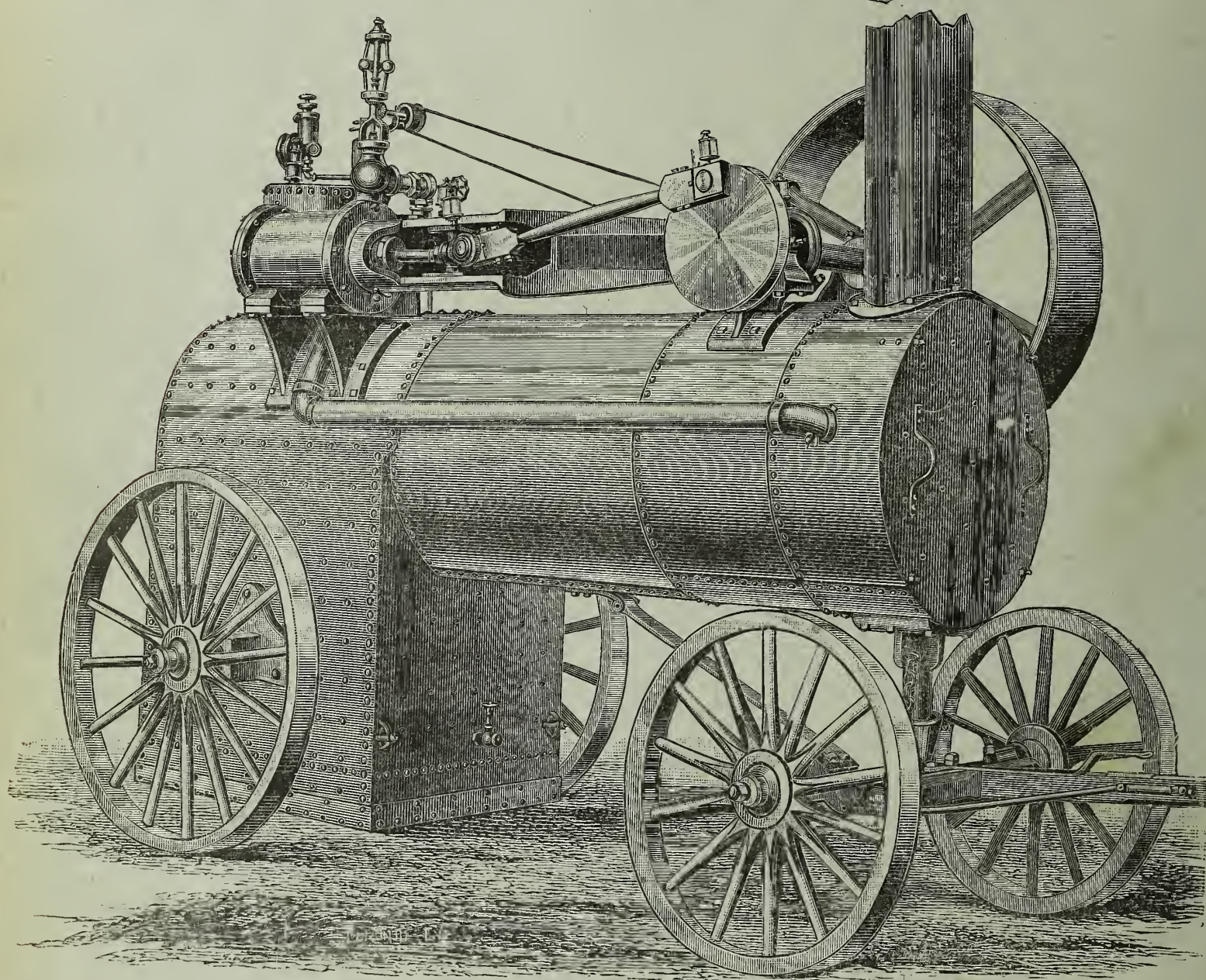
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The MINING REVIEW

Established 1882

Vol. VII.—No. II.

1888.—OTTAWA, NOVEMBER—1888.

Vol. VII.—No. II.

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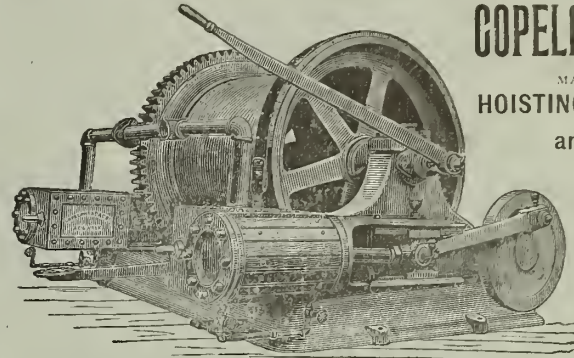
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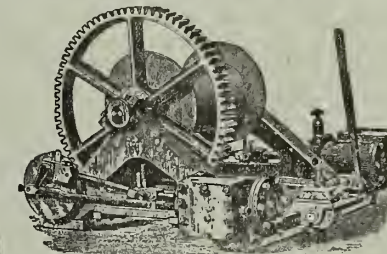
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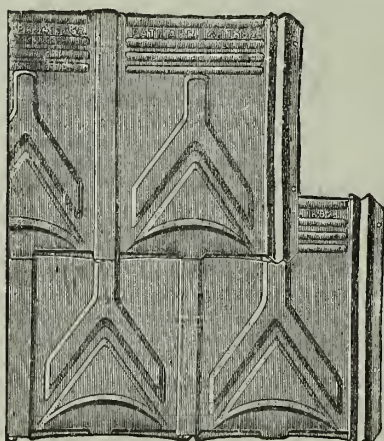
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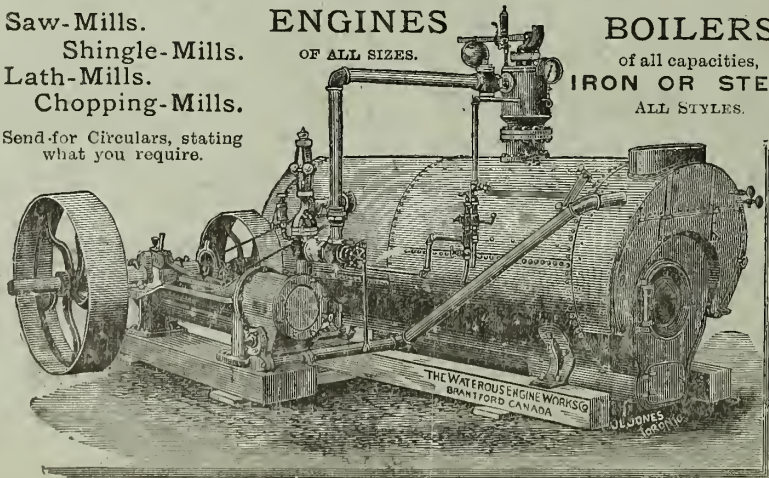
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The use of Steel Supports in Mining.
—In a paper recently read by Mr. A. L. Steavenson, M.E., before the North of England Institute of Mining Engineers, it was stated that the result of a trial on a large scale of steel beams in the iron mines in the Cleveland district was entirely favourable to their adoption from the points of both economy and security. In the mines in question the expenditure for timber is about \$50,000 a year, even when not working full time, and the average life of the timber in consequence of dampness was not more than two years. Out of nearly 200 tons of steel now in use only one beam has failed, and it is demonstrated clearly that in strength the advantages gained where the roof is heavy are marked, fewer pieces being required and a much better and neater arrangement can be effected with a clearer road, owing to the smaller size and number of props. After an experience of three and a half years the work seems to be in perfectly good condition, so that permanence is effected instead of frequent renewals. Including the packing material and all labour, the average cost of six steel board end crossings was £5 4s. 1d., for timber, or an increase of 36 per cent. which increased cost is considered amply compensated by the advantages gained

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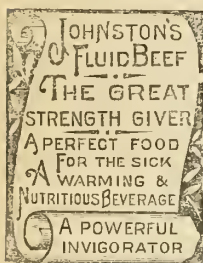
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Steam Pump Practice.

By HIRAM R. JONES.

[From the American Machinist.]

If a suction pipe is obstructed; too small or too long, the pump will be "starved," so to speak, and if the velocity of the plunger is greater than the inflowing water, there will be a partial vacuum formed between them, and on its return stroke the plunger will strike the advancing water with great violence, producing a severe shock and strain on the valves and joints of the pump and pipes.

A partial remedy for this evil is to put a large air chamber on the suction pipe near the pump. This will make an elastic cushion of air for the incoming water to come into contact with, and so not to strike the returning plunger with so hard a blow. But while a suction chamber is always an advantage, it will not stop the pounding if the average of the volume of water is not enough to follow in close contact with the plunger. In this case the proper remedy is to put in a larger suction pipe.

Many a good pump is blamed for not doing its work smoothly, when the only trouble is a restricted supply of water. In some situations, in order to bring the pump under the immediate charge of the engineer, it is necessary to use a very long suction pipe. In such cases it should always be one or two sizes larger than the pump connection calls for, and the water should flow to the pump from a head, or have a very moderate lift.

Should there be a leak in the pipe, so as to allow air to enter, the plunger will act something like the case just mentioned, but instead of the plunger striking with a solid blow, it will impinge against the air cushion formed. The first part of the return stroke will be very quick, but will gradually slow down to its normal speed as the imprisoned air is compressed, but without severe shock, as in the former case.

If the suction pipe is short and vertical, and has a leak in it, the pump will discharge about the same quantity of air at each stroke, but if it runs a long distance horizontally, and the leak is near the far end, the action of the pump will be spasmodic, sometimes getting solid water, and then great pockets of air will flow into it, causing it to dance back and forth for several strokes before it will get water again. If the pump is working against a heavy pressure, and there is much clearance, air will sometimes come in in such large quantities that the stroke of the plunger will not be sufficient to compress it enough to lift the discharge valves, and the return stroke will not expand it enough to produce vacuum enough to lift receiving valves. In this case, the action of the pump will be very much like compressing and releasing a spiral spring between the palms of the hands. When a pump works this way, engineers say "she has lost her water." Should this happen, close the valve in discharge pipe, and open the pet cock until the air is out, and water appears.

As what is going on inside of pumps and pipes is hid from the sense of sight, our knowledge of their diseases depends very largely on the action of the piston, and the sounds produced—the causes of which we must reason out. We can see them only with our mind's eye. If pumps and pipes were transparent, we could see the air moving along always in the highest place it can find, like the bubble in a spirit level. Fill a glass bottle with water nearly full, cork it, tip it about in various positions, and the relative positions of air and water are readily seen.

I would suggest, right here, that makers of philosophical school apparatus make pumps and engines of glass, in order to show what is going on inside. Make long suction pipes, short ones, small ones, large ones; provide leaks in them in various places, to be controlled at will. Make vertical curves with elevations and depressions, to show how air traps impede the flow of water. In this way, the flow of water and pump action, can be shown, and much more clearly than it can be described without this aid.

All pumps with high lifts or long suctions should have a foot valve *just above the water level*, and have it so arranged that it can be got at for examination or repairs without breaking the pipe connections.

A primer is very convenient. It is simply a small pipe with a valve in it, connecting the discharge pipe with suction. By this means the pump and suction can always be charged and ready for instant use, should it stand for some time unused. It should be closed when pump is working.

It will also serve to detect leaks which might occur, and would not show up were there no way to put pressure on suction pipe.

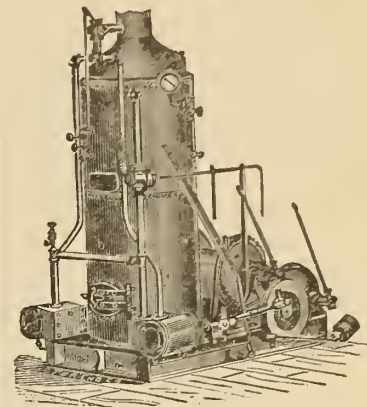
A *very small leak* in a suction is an advantage, as it keeps the air chamber charged, which would otherwise become filled with water as the air became absorbed by it. In pumps that are perfectly tight—a rare occurrence—a pet cock should be provided below the receiving valves, to admit air occasionally, if the pump begins to pound.

Hot water or boiler feed pumps have diseases peculiar to themselves. When water is heated to about 100 degrees Fahrenheit it will begin to boil in a vacuum, and produce steam with an increasing pressure as the temperature rises, until the boiling point in the open air is reached, when the pressure of the steam will just equal that of the atmosphere. Now the sucking action—so called—of a pump is not such as to *pull* water into itself as you would pull a boat towards you with a rope, but simply to produce a partial vacuum by moving away from the water and allowing it to follow after, forced in by whatever pressure there may be on it, whether atmospheric or otherwise.

Water heated nearly to the boiling point in the open air has just pressure enough on it to keep it from producing steam. To show what would be the result of trying to pump this water, we will introduce a case in practice. Suppose that it is attempted to pump it from a heater or cistern, the water level of which is two feet below the pump. Now to force this water into the pump will require an additional pressure of nearly one pound on the surface of the water, or what would be its equivalent, the removing of the same amount of pressure from the surface of the water standing in the suction pipe. Suppose that we start the pump and remove nearly one pound of pressure as indicated. The result will be that the water immediately boils and produces steam, and we would pump steam instead of water. If the speed of the pump is increased slightly we pump both steam and water, and with not very smooth action either, for this steam, unlike the air, would be condensed by the returning stroke of the plunger, and what little water may have entered with the steam will be met with a blow like a steam hammer. The remedy is to raise the level of the water, or lower the pump so that the water will have some head or fall to pump. The action, as above described, will sometimes occur when the water level is as it should be, but suction pipe too long, too small, or contracted by valve elbows, etc.

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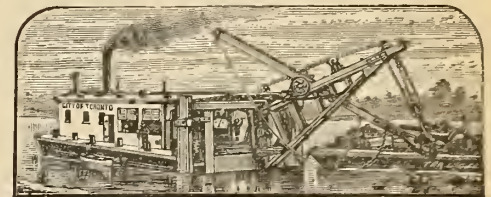
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The Canadian Mining Review

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OTTAWA.

Vol. VI. NOVEMBER, 1888. No. 11.

Foreign Analysis of Phosphate.

The most unsatisfactory feature in the Canadian Phosphate trade is the manner in which the quality of shipments made to Europe is determined. It is customary to sell the Phosphate with a guarantee that the quality shall not fall below a given standard. This was, in the earlier days of the industry, seventy per cent. of phosphate of lime, but the standard has been raised to 75 and 80 per cent., and any lot falling below that guarantee is rejected and then bought in, as a rule, at a lower price. By the time the quality is determined the phosphate is usually in the possession of the buyer and the seller is therefore at his mercy, for if the new terms are not accepted the cost of removing and reselling involve a loss perhaps greater than the reduction that is proposed. So great are the advantages of these rejections that the buyers are very strenuous for high guarantees; and the uncertainties of analyses give many chances to secure good bargains. Every shipper has his stock of grievances to relate and we know of one case in which, on a falling market, a loss of \$3,000 was made on a single shipment in consequence of its having analyzed in England a trifle under the guarantee.

Probably there are few businesses in the world conducted on so radically unjust a basis. To send goods to a foreign land and put them into the hands of the buyer before their value is determined, is an act which must be characterized as folly when we consider that trade, under its present competitive conditions, is merely civilized warfare and each combatant is bound to take every advantage that law and custom will permit. The obvious course is to determine the quality before shipment, and to do this in a manner to satisfy the foreign buyer, it would be necessary to appoint a Government sampler and analyst. Ashes have an official inspector, although the total exports of this article from Montreal in 1887 were 3,384 barrels as against 20,349 tons of phosphate exported.

Many accusations have been made against the fairness of European sampling and analyses, and stories are related of the bribery of the men having charge of the selection of the sample. A careful investigation of the methods employed in sampling cargoes warrants the assertion that this is as fairly done as the recognized system permits, but as not more than two per cent., if as much, is ever taken for a sample, there remains a chance of variation which can hardly be obviated until the trade

changes to the shipment only of pulverized phosphate,

We regret to say, however, that the accuracy of the analyses is often open to question. By observation of the certificates of various analysts it becomes known in time which of the chemists are usually more favorable or otherwise in their results and they become known as "high" chemists or "low" chemists. The sample from the ship is, as we have said, usually chosen impartially, the method being to set aside one tub, basket or bag in each hundred or fifty as may be decided upon, the men in the ship's hold having no knowledge as to the choice. After this reserved quantity is ground the buyer's, seller's, and agents send samples in sealed bottles to their respective chemists. Naturally the buyer chooses a "low chemist" and the seller takes a "high chemist".

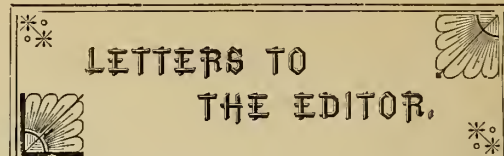
A comparison of the analysis of the total shipments made in one year by a Canadian shipper is instructive. The results were as follows:

	Buyer's Chemist.	Seller's Chemist.
Cargo No. 1	80.99	82.52
" No. 2	73.58	76.10
" No. 3	74.57	78.14
" No. 4 (part)	75.98	77.58
" No. 4 (balance)	76.24	77.28
" No. 5 (part)	{ 79.43	81.21
" No. 5 (balance)	{ 77.89	81.51
" No. 6	80.463	{ 75.75
" No. 6	78.63	{ 77.36

Thus in only one case out of eight were the buyer's chemists higher than the seller's. The differences show, in the first place, how great is the chance of variation and what risks are run by giving a high guarantee; and, secondly, these figures indicate either that chemistry is a science that discriminates in favour of the patrons of its priests, or else that wrong results on one side or the other are obtained. It is due to the eminent chemists concerned to say that they are above suspicion of unfairness, unless we may attribute to them an unconscious bias in favour of their employers, but we prefer to think that different methods of analysis are employed and the morality lies with the principals who select "high chemists" and "low chemists" to do their work, and after all this is only "business."

But we submit that this feature of the phosphate trade needs remodelling and that the determination of qualities should be placed beyond the influence of competition. Chemists should also agree upon some uniform method of analysis, so that a variation by two analysts of 3 to 4 per cent upon the same sample should not occur.

Prof. Sterry Hunt, in his paper read before the British Association on "The Study of Mineralogy," advocated a system of mineralogy based on the successive forms which are imposed upon matter: (1) The chemical form, or composition; (2) the mineralogical form, or physical state; (3) the crystalline form, being the most accidental.



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We do not hold ourselves in any way responsible for the opinions expressed in this section of the REVIEW.

Natural Gas in Canada.

Ottawa, 2nd Nov., 1888.

The Editor

SIR,—My attention has been called to an article in No. 8, Aug. 24th, of the *American Manufacturer*, under the heading "LITTLE NATURAL GAS IN CANADA."

It appears to be a report of an interview with Mr. E. C. Beardsley, of Pittsburgh, who has been visiting the gas fields of Canada.

We are not informed what gas fields he visited, and he refers only to certain wells in the Province of Quebec.

He goes on, however, to say "There is no hope that there will ever be found in that country, any gas wells which would be considered at all valuable producers by the companies operating here." Now, this is, it seems to me, an exceedingly rash and hasty opinion, and while it may prove correct as regards Quebec and Ontario, it is certainly not correct as regards the North-West, as is proved by the well at Langevin Station, on the C. P. R. 247 feet above the sea, where the gas has been poring out with great force from a depth of 1151 feet, for more than four years. However, I for one, and doubtless many others of your readers would be interested in learning what reasons Mr. Beardsley can give for the opinion he expresses and, why he thinks the Trenton and other formations of central Ontario, which underlie the Niagara formation there, as they do in the Ohio Gas regions, should not prove equally productive of natural gas or petroleum.

I am, dear Sir, yours truly,
ALFRED R. C. SELWYN,
Director Geol. Survey of Canada.

The Utility of Waste Sawdust.

Ottawa, 19th Nov., 1888.

The Editor

SIR,—The recent investigation into the sawdust nuisance was referred to in a late issue of your journal, and now the evidence at Deseronto before the Ontario Mineral Commission proves that this fuel can be economically made useful at a profit to the lumbermen. The point that interests the large majority of your readers is the economic and useful application of the large and valuable fuel supply of the several Provinces of the country now wasted both in the woods in cutting timber and logs, making roads &c., and in the manufacture of the logs at the sawmills into lumber. This waste is equal to about one-half of the yearly produce of the sawlogs and timber from the forests annually produced in the various lumber districts, and is equivalent to many hundred thousand tons of coal. Now are the mine owners mindful of their interests in allowing this natural and yearly produced fuel supply to go on unused? Now that protection by tariff on imported iron has been adopted by the Government it behooves

the owners of our mines of iron and other ores requiring roasting or smelting to come to a clear understanding of this waste of a fuel supply admirably adapted for their purpose and cause measures to be taken to have it utilized for the joint benefit of the timber makers, saw mill owners, and themselves, and indirectly the whole community. An authority says:—"Either the mill owners must burn the refuse or remove their mills."! They do not require to move their mills or destroy this fuel. In Ottawa two of the mills would be expensive to alter but the others would not cost so much, and it will pay well for all of them to have the necessary changes made. The mill waste can be utilized, not destroyed either by fire or water, and the mill owners will reap the benefits of a wise trade economy as is done in several instances by other lumbermen.

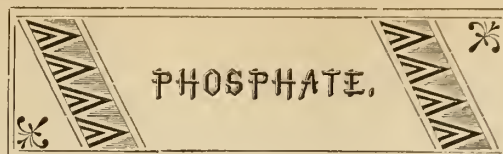
The destructive burning of sawdust to get rid of it is a system of waste contrary to the conservation of energy or fuel wherever it is practised, and the Government, aided by the lumbermen and mine owners, should take an interest in having the "burning nuisance" stopped, and made a means of wealth in place of loss as at present. There has been at least twenty years of demonstration in the utilization of sawdust in the roasting of iron ore and reheating iron in Europe. Saw mill waste has been used with economy and success in the manufacture of iron in the United States. Charcoal has been used for smelting iron ore in Canada since 1735, and the St. Maurice furnace at Three Rivers "is the oldest active furnace on the American continent."

If more demonstration is required that too can be furnished. The view taken of this subject seems to incline more to the evil that has been done (a fact which is only too apparent on many of our largest rivers in each province), while the good that can be accomplished with the economic use of it as a fuel is not considered, or is treated as a secondary consideration, when it is the all important ore. Let each district having ores to calcine, roast, or smelt, send a petition to their member of Parliament to have the wasted fuel supply of their district both in the woods in cutting timber and logs, making roads &c., and at the sawmills, made available for their use and let it begin at Ottawa.

I am etc.

ENGINEER.

The Copper Syndicate.—English papers state that a new contract has been entered into between the Copper Syndicate and the copper producers which is to take effect at the expiration of the agreement now in existence, that is, at the end of three years from the time that it was entered upon. The terms of the new contract are:—"According to the arrangements at present in force, the syndicate takes the production of the mines at a minimum of £62 10s. per ton in the case of the Rio Tinto; of £64 for the Calumet and Hecla; of £65 for the Mason and Barry, and of £70 for the Tharsis and the Cape Copper Companies. Further the syndicate pays the cost of storage, assurance, etc., and after receiving £5 per ton on account of its services, shares all excess profits with the companies. According to the new combination, the syndicate binds itself to take all the copper produced by all the companies, at a uniform price of about £72 10s per ton. It further abandons its claim for £5 per ton in excess of the minimum price, and shares equally with the companies in the profits remaining after all expenses have been paid."



In General.

The quantity of phosphate exported from the Ottawa Valley to the United States for the quarter ending 30th September last, was 700 tons, of a value of \$7,080.35. This quantity, which was all ground, was shipped to Buffalo and Chicago.

The chief competitor with Canadian phosphate of late has been the Somme phosphate. It is now stated that these deposits are limited in extent and will soon be exhausted. Mr John D. Frossard has lately returned from France, and states that he has been commissioned by one of the largest fertilizer manufacturers there to report on Canadian phosphate mines with a view to the consideration of their future source of supply.

Du Lievre.

Dr. Francis Wyatt, a prominent analytical chemist, and associate editor of the *Engineering and Mining Journal* of New York, has lately paid a visit to the mines in this district. He states that an increasing interest on the part of American capitalists is being taken in our phosphate industry, and a considerable development may be looked for from that quarter, in the near future. Dr. Wyatt, we understand, will make a report on the industry to wealthy capitalists seeking investment, and from all we can learn, his statement will be most favourable to the district.

A portable engine pump has lately been added to the plant at the Little Rapids mines. A small staff is kept on development work.

The locks at this point are again under construction. "Ante-Humbog" writes to the *Ottawa Free Press* protesting against the excessive delay in carrying out this work, to the detriment of the important mining operations being conducted on the river, and draws attention to several instances of flagrant carelessness and inefficiency as exemplified in the present condition of the works. During our visits to this section we have heard many bitter complaints from the miners on this subject. A great deal of annoying delay in forwarding shipments has been directly caused by the alteration of the channel through the careless construction of one of the piers, and by stones from the excavation having been projected into the only navigable channel. It is nearly two years since this comparatively small work was first commenced, and surely it is high time that some more vigorous and energetic action was taken. Mr. W. J. Poupore, one of the contractors, has since written a very lame explanation of the delay, but in view of the recent developments of the Frazer case, his letter partakes very largely of the nature of a farce.

Mr. E. D. Ingall, Mining Geologist to the Geological Survey has recently returned from the field of his labours in the Du Lievre phosphate region. We understand that notwithstanding the unfavourable weather experienced, the investigation he has had in hand, namely, the study of the nature of the phosphate de-

posits and their associations with the enclosing rocks, has been well advanced. At least another season's field work however will be required before sufficient evidence will have been accumulated upon which to base conclusions, which will be of any use to the community interested, and which shall advance our knowledge of these matters beyond the point at which previous investigators in the district have left it. In this work he is being assisted by Mr. Jas. White, who is doing the necessary topographical work for the construction of a large scale map, upon which the results obtained may be shewn.

The High Rock Mine is producing large quantities of high quality ore from pit number eleven. Lately, special preparation was made for a large blast and shots were fired in 10 holes simultaneously by the electric battery. 100 tons of phosphate were blown out and the show still looked as well as ever.

The Phosphate of Lime Co.'s steamer "High Rock" has met with a serious accident which will unfit her for further work on the river this year. It is fortunate that the casualty occurred so late in the season. We understand the whole damage is fully covered by insurance.

The Canadian Phosphate Company is doing well both at the old Star Hill Mine and the new Ruby Mine, which is being fitted up with suitable appliances for effective work under the new manager Mr. J. Lanson Wills, an English mining engineer of good education and large experience. He has been connected with phosphate production for several years both in the Island of Aruba in the West Indies, and also in France. It is encouraging to have men of this stamp engaging in the Canadian phosphate industry, for although its peculiarities make experience the first essential for its successful prosecution there is doubtless great advantage to be derived from scientific knowledge. Many mistakes and much wasteful efforts have been occasioned by the too common contempt for "theory" which is characteristic of practical miners. A union of both knowledge and experience makes the successful miner, always allowing of course for the prime essential in underground explorations—luck!

A German miner, named Robert Lange, had his right leg badly crushed by a fall of rock at the Canadian Company's mines. Although the limb is severely injured, the doctors hope that amputation will not be necessary. He is receiving every care at the Protestant Hospital, Ottawa.

The Dominion Company are meeting with great success at the North Star Mine. Work has been discontinued for a time on the deep pit in order to test other portions of the property, and the new workings are proving exceedingly rich. According to various reports, from 600 to 1,000 tons are being produced monthly. Owing to the low water in the Lievres River and the non-completion of the canal, which seems doomed to be delayed for still another year, the Company was unable to ship all of its output this season and is now forwarding to Montreal 1500 tons of fine ore to be stored there during the winter, so as to be ready to take advantage of the cheap freights that usually offer at the opening of navigation.

The Emerald Mine is pursuing work which will further increase the output of this remarkable property, which has up to the present been the most productive acreage in Canada.

The Central Lake Mine continues to be advantageously developed by the veteran phosphate miner Mr. Peter Powers, under the direction of its owner Mr. S. P. Franchot. Over a dozen pits have been opened on good bodies of phosphate, and a tunnel is now being driven to strike a number of veins that appear on the surface of a hill.

The Anglo Canadian Phosphate Co. has had some prospecting done on the High Falls Mines, which adjoin the Central Lake property and additional shows have been found besides the many that have already been opened. On one of their properties in Wakefield a show has been found by the noted prospectors, the brothers Tenpenny, who are so confident of its extent that they have made a contract to work it and will at once erect buildings and open roads.

An immense bed of quartz exists on this property which was declared by Mr. H. S. Vennor to be auriferous and recent examination confirms this opinion. Capt. Adams has lately visited the place and taken a variety of samples and we shall be able to report the result in our next issue.

Templeton District.

Dr. Mahon Hutchinson and Mr. Kasson, representing Chicago capitalists, have lately been examining phosphate lands in this district with a view to purchase. They also visited the mines in the Lievres district and were very favourably impressed with the large industry at present being carried on there.

Mr. C. B. Falardeau, of the Canada Industrial Company, is in negotiation with Chicago capitalists relative to the sale of his mines.

The cutting for the new inclined tramway at the Blackburn mines is nearing completion. This work has opened up several new veins which are yielding paying quantities of the mineral.

Perth District.

At the Otty Lake and Bobb's Lake Mines, the Anglo Canadian Co. continue to have good success with their contract work. At Bobb's Lake especially the deposits are turning out numerous and easily worked, so that an output of 10 to 12 tons per month, per man, is being steadily maintained. Last month an average force of 15 men all told, put out 158 tons. The men are clearing \$2.50 per day for themselves.

Kingston District.

We note that the Ontario Mining Commission, who, by the way, are collecting much valuable information and doing excellent work throughout the province, have had their attention directed to several valuable properties at present being worked in this district, and among them the mines owned and operated by Capt. Boyd Smith at Eagle Lake, near Tamworth. Here one shaft has been sunk to a depth of 140 feet. The width of the vein, or rather the pay streak, opens out to 12 or 15 feet and then pinches to almost nothing. The phosphate obtained is red and green. The average of the shipments is about 84 per cent. This location was originally taken up for iron, and about 600 tons of the finest magnetic ore have been taken out, but the formation does not appear to favour

the existence of iron to any large extent, and the greater part that has been raised has been taken out in mining for phosphate. From the Eagle Lake property Capt. Smith has shipped 3,200 tons, the principal part going to the United States. Capt. Smith considers the American market the most promising for Ontario phosphate. As compared with England and Germany, there is a considerable advantage in the matter of freight, while the price is about the same in Philadelphia as in England. As regards duty, all fertilizers are admitted free to the United States. All this looks well for the future of the Canadian phosphate interest, whose present proportions and future possibilities are but imperfectly known. There can, however, be no doubt about it that, properly worked, there is lots of money in it.

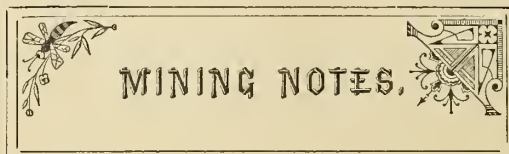
Mr. Wadley, who has secured an option on Mr. J. W. Trousdale's property near Sydenham, will sink a 75 foot shaft as a test.

At the Foxton pits, Sydenham, about 300 tons of high grade phosphates are ready for the ice. The shaft is now down 125 feet, showing a vein from 12 to 15 feet wide and drifts S.W. by N.E. of main shaft are opened. A steam hoist has recently been added to the plant. Additional accommodation has been provided for the miners, and a store house and magazine have also been erected.

Drifting has been carried on at Mr. Hibbards' tunnel at Ell Lake for a distance of 70 feet.

Messrs. Spalding & Kirwin's tunnel is being worked day and night. The proposed length of this tunnel is 640 feet, of which 80 feet is already driven.

The American Consul at Kingston informs us that 314 tons of phosphate have been shipped from this district to United States points for the present year.



We shall be greatly obliged to mine owners and superintendents for such authentic reports of their operations as may concern shareholders and the public.

Newfoundland.

Copper mining in the north is going forward with much spirit and energy, the price of copper being high. At Tilt Cove mine it is expected that a thousand men will be employed this winter. Smelting works are in course of erection. At Little Bay copper mine 500 miners are at work, and 1,100 men employed. In other localities it is expected that new mines will be opened next year. As mentioned in a recent letter an important discovery of magnetic iron ore has been made at St. George's Bay, in proximity to the coal beds of that region, which are still unwrought. A sample of the ore has been sent to New York, and on analysis proves it to be of the best quality. The attention of mining capitalists has been attracted to it and a first-class mining expert has been sent to examine and report on the deposit. He arrived by last steamer from New York, and is now on his way to St. George's Bay. Should his report be favorable, abundant capital will be forthcoming to work this mine, and as coal is at hand, there

can be no doubt that it will be utilized. There is thus the prospect of extensive iron works springing up here. Our correspondent is assured on high authority that the quantity of this splendid ore is immense. Already a second deposit has been found in the same locality and a grant secured. A well informed gentleman who examined the ore here, and has much skill in that line, states that there was nothing equal to it, or even like it, found in the Dominion. The very finest steel is manufactured from this ore. The presence of coal at hand adds greatly to the importance of the discovery. A half-breed who had known the secret for years, but kept it to himself rigidly, was at length induced to tell what he knew to his employer and to conduct him to the spot. It is said that an iron fever is setting in in Bay St. George.

Nova Scotia.

With the exception of the "Drummond," which only worked three days last week, the various collieries throughout the province continue to work full time, and a very fair output of coal is being maintained. Orders are not coming to hand with so much regularity, but most of the collieries are at present well supplied.

The operations carried on at Five Islands by American Capitalists under the direction of Mr. Wilkinson, have not yet resulted in any valuable discovery, but the indications appear very encouraging and prospecting is being vigorously carried on. No. 1 drift has been driven 90 feet, and in that distance cuts three seams of coal of first class quality. These seams are small but experienced men have no doubt but that to the dip workable seams will be found. Drift No. 2 was only driven a short distance before a fourth seam was found; this was somewhat larger than the others and coal taken from it has been tested and is very highly spoken of. No. 3 Drift has been commenced, and at last reports was in some 70 feet in dark fire clay. The company seems inclined to spare no expense in order to prove the value of their extensive property.

At the Intercolonial Company's mines work is dull, but it is thought that the winter's operations will be better than predicted. No effort will be spared by the management to bring about such a desirable state of affairs.

At the Black Diamond colliery about one hundred tons a day are being shipped. It is gratifying to know that the owners are meeting with deserved success in the opening up of an abandoned property. They are at present drifting from near the bottom of the present pit to prove a new seam which is said to extend into their property.

At the Acadia mine (the property of the Acadia Coal Co., limited) work is going ahead briskly, and the management are turning out all the coal they can.

At the Albion mine (owned by the same company) work is not so good, and at the north and south sides of the Macgregor pit the men are only working every other day, and three quarter time at that. Coking coal is furnished from this pit to the Londonderry iron mines. At the Ford pit the management expect to have the big pumps going by the end of next week, when the unwatering of this pit will be continued, and it is hoped without intermission. At the English slope the sinking is going down fast, and the

coal is said to improve to the deep; the depth at this point is 800 feet. A new Dominion safety boiler and other machinery has been erected at the third seam. It is expected that the seam will be ready for a large output by the beginning of the year.

At the Vale colliery the new lift has been sunk 600 feet and levels broken off; coal if anything a little higher, and of excellent quality for steam and furnace use. The output from the McBean slope last month was some 450 tons per day.

At Springhill the miners are experiencing dull times; only one slope is working, owing to two of their slopes being "drowned out." More constant work will be had when the water is out of the slopes.

It is claimed that a valuable seam of coal has been discovered at Brookdale, twenty-three miles west of Spring Hill, but owing to the faulty nature of the ground and the very wet season, little can be said about it as yet.

At the Joggins, work is steady and about 150 tons of coal is shipped per day, mostly railway and local land sales.

There is considerable excitement in iron and copper just now on the Grant Area, East River. Capt. McVicar has 14 men at work mining and shipping the ore to Eureka Station, and from there by rail to Londonderry. The ore is pronounced by the Londonderry people to be of very superior quality, and it is a wonder no one takes more interest in these valuable iron properties.

In the Guysboro Specular mines some work has been done and the veins traced for a long distance. The ore carries 73% of metallic iron and of the very best quality and free from acids. No doubt work will be resumed in the spring on an extensive scale.

At the gold mines work is fairly brisk. Edgerton is doing about as usual and turning out 100 oz per month for about fifteen men's labour.

Dr. McMillen and others have been prospecting their property on a large scale at Sheet Harbour, near the Board Camp diggings and have uncovered four valuable veins all showing gold. They have 72 areas, and as this property is on the Salmon River belt, great things are expected from it.

It was thought at one time that this season's shipping at Cow Bay would not reach or exceed that of last year, but it has turned out otherwise. Up till date the shipments are considerably in excess of those to the same time last year. The miners too have made a better average pay than last year. The "Ashdene" has left with her fourteenth cargo. She will make one more trip. This vessel carries a cargo of 1500 tons, and when her last cargo for the season is shipped she will have carried the large quantity of 22,500 tons. The "Glendale" will overtake fourteen trips, carrying 1,400 tons on each occasion.

The shipments at the Reserve mines are also in excess of those for the same period last year.

The shipments from Caledonia Mines for the nine months ending Sept. 30th, reached the high figure of 87,000 tons, several thousand tons in excess of shipments for same period of last year.

An average shipment of 22,000 tons per month, for four months, is a remarkable good one. A considerable quantity more of coal is expected to be shipped previous to the close of navigation. During the coming winter the levels will be extended, and it is also the present intention to sink the deeps.

Mr. J. H. Coldwell, of the Minneapolis Mining Company, has purchased of Amos and Busby Fisk and Richard Hunt, the property known as the Fisk leads, on the Molega barrens for \$9,000.

The Rabbitlead on the property of the Molega Mining Company is supplying good quantities of 2½ oz. ore to the crusher. This is a fine lead that appears more promising with every blast.

New discoveries of gold are reported from North Brookfield and West Caledonia.

As a result of 17 days crushing 207 ounces of gold were milled from 43 tons of quartz at the Withrow mine, South Uniacke.

The Dufferin Mining Company returns 267 ounces from 600 tons of quartz crushed as its yield for the month of October.

The yield at the Touquoy property, Moore River, for last month was 54½ ounces of gold from 380 tons of quartz crushed.

The Oxford mine returns for October are 144½ ounces from 149 tons crushed.

The Whiteburn Company report for the same period 213½ ounces from 80 tons quartz.

The following are the official returns so far received at the Mines Office for the month of October.

District.	Mill.	Tons Crushed.	Ozs. Gold.
Sherbrooke,	Miners,	200	54
"	Goldenville,	40	5
Darrs Hill,	Dufferin Mg. Co.,	650	267
Cariboo,	Touquoy,	380	54½
"	Montreal Co.,	302	49
"	Caffrey Mill,	8	10
Uniacke,	Withrow,	46	217½
Lake Catcha,	Oxford,	149	144½
Whiteburn,	Whiteburn Co.,	80	113½
Fifteen Mile Stream,	Egerton G.M. Co.,	170	74
Stormont,	Rockland,	396	386
Renfrew,	Free Claims,	40	25½

The unusually wet weather of the past spring, summer, and autumn months, has interfered greatly with the labors of gold miners. Mines usually almost dry have been flooded with surface water, while in others the pumps which before were of sufficient capacity to keep the water down, have had to be replaced with more powerful ones. This has caused delay, and it speaks well for the richness of the mines that, in spite of these great drawbacks, the yield of gold has been so large. If returns continue to come in to the Mines Office as large in proportion for the balance of the year, the prospects are that the total yield for 1888 will exceed that of the past year.—*Critic*.

New Brunswick.

The Markhamville Manganese Mines and mills are in active operation, upwards of forty hands are employed in and about the mines. Major Markham has just returned from the west, he attended a meeting of "The American Institute of Mining Engineers" at Buffalo. He also sold considerable high class ore to various manufacturers in the western and east-

ern cities. He is now shipping 260 tons of blast-furnace ore by schooner from St. John to Philadelphia.

Capt. Alley has a few men still working at the Glebe Manganese Mine in Waterford; the captain certainly deserves credit for his courage in sticking to this property in spite of many discouraging elements.

The N. B. Gold and Silver Mining Co. have a No. 5 Blake pump with boiler and steam and water pipes at Sussex station, on the way to their mine at Philamaroo. This pumping plant is supplied by McAvity & Sons, St. John, the proprietors of the famous Boiler-Feeder which is rapidly displacing all other kinds, in this neighbourhood.

A gentleman from Boston has during the summer been operating in a small way the several times-abandoned manganese mines on Quacco head, in St. John County, but our correspondent believes no shipments of ore have yet been made.

The Baltimore people who bonded or bought the Stockton manganese mine have not yet taken possession; neither is the Equity suit which Mr. Gould instituted against the property settled. Hence nothing is being done at the mine this year.

The Freeze copper mine, in Albert County, is still at rest. The parties having the property bonded appear to have failed in effecting a sale in London. This is to be regretted, inasmuch as the mine is said to be a valuable one, and the owners, having expended a large amount of money already, are unable to continue the operations.

Quebec.

Notwithstanding the unfavourable weather a large quantity of asbestos has been taken out this season, but although the output shows a marked increase over former years, the supply of the mineral has not been equal to the demand particularly for the first and second qualities, and many manufacturers have been obliged to use "seconds" entirely. The prices have also gone up and we are informed that firsts are now selling at \$95, while seconds realize from \$50 to \$60.

Another correspondent writes: "The long continued wet weather this season has seriously affected the working of the Asbestos mines and the output is considerably under what it would have been with a fine dry season. There has been a good demand for the output all of which has been placed at advanced prices. This fact has caused considerable excitement in the district and some new properties have been opened up, but only a limited quantity of surface asbestos has been produced from these. The asbestos business is increasing steadily, but there is as yet, no fabulous consumption of the mineral as some people in the district imagine and the supply, so far, has been about equal to the demand, this season's restricted output being the means of our getting advanced prices."

The output from the Anglo-Canadian Asbestos Company's mines will be about 200 tons to date, this season. Operations have been confined to sinking and doing some further exploratory work, and the management have uncovered some

of the largest and best veins ever discovered on this property, one of these from bottom of pit measuring over 7 inches in width. This system of working required only a limited staff of hands, hence the smaller output.

The Bell Asbestos Company will take out 1200 tons. Air compressors, steam, drills and the latest labour saving appliances are now in use at their quarters, and it is estimated that their profits on the present season's work will figure close upon \$50,000.

The Johnson Company have also done remarkably well, the shareholders clearing a large amount on the season's operations.

King Bros. who make a specialty of clobbering and cleaning their ore to perfection, and in this way obtaining the very best prices, have sold their entire output and must also clear many thousand dollars. Their mines are in splendid working condition at present and reflect great credit on the manager, Mr. W. King, M. E.

On account of the low lying location of their property, the Ross Ward Co. have suffered much by the wet weather, which has greatly retarded their operations and consequently greatly reduced the output from what it must have been under more favourable conditions. They have, however, done fairly well.

Some twenty men are employed at the plumbago property on the Lievre. It is expected that the mills will be working by next June.

The Villeneuve Mica and Mining Company of Buckingham has closed down their mines at High Rock for the winter. Mr. Von Rehm, the manager, leaves shortly for Europe.

We have received some fine samples of ore from the Lawn Silver Mine, owned by Messrs. J. & C. Russell, Renfrew. Two shafts are being sunk on the property, and the ore increases in quality as depth is attained.

The surface openings on the property of H. A. Church, in the Township of Cawood, show a number of large crystals of excellent quality of mica, and give good encouragement for further development.

Messrs. J. & C. Russell, Renfrew, have taken out 200 tons of iron ore from their Bristol mine.

Mr. Louis Wertheim, the largest asbestos manufacturer of Frankfort, Germany, accompanied by his son, Mr. Ed. Wertheim, has been visiting several asbestos properties in the province with a view to purchase. We are informed that he has taken over Dr. Reid's property in Coleraine, consisting of 100 acres, paying in cash \$40,000. He is also negotiating for a further purchase of 300 acres in Range A of Coleraine. Captain W. L. D. Learmonth has been left in charge of the property. An extensive working plant, consisting of steam drills, air compressors, 100 horse power engine, derricks, &c., is being purchased, and every effort is being made to work the property on a large scale. Operations have begun and will be continued during the winter. Mr. Wertheim is greatly pleased with the appearance of our asbestos mines, and speaks very highly of the quality of the mineral, which he has been importing largely for some time.

Ontario.

It is reported that a rich find of gold has been made on the location owned by Mr. Isaac Moore, Ottawa, about 2½ miles from Straight Lake Station, on the line of the C. P. R. Mr. A. C. Lawson, of the Geological Survey, has just returned from that district, and has brought with him a number of samples, which are being assayed by Dr. Hoffman.

"The Wahnapiatae Mining Company," with a capital stock of \$30,000, divided into \$1,000 shares, has been incorporated under the Ontario Joint Stock Act. The promoters are A. M. Dodge, the big New York lumberman; James Scott, Toronto; G. F. Marter, M.P.P., and J. W. Hartman, of the same place. The company will carry on general mining business in the district of Nipissing.

It is expected that the main vein of the Connolly mica pit near Sydenham will be tapped in a few days.

A commodious boarding house is being erected at Smith & Lacey's Ell Lake mica mines. Some fine mica is at present being taken out. During the winter new steam pumps and hoisting machinery will be put in, together with several new buildings. The same firm has recently opened a white mica property near Caladar. The vein has been traced by surface outcroppings for a distance of one and a half miles.

Port Arthur District.

The Badger mine, which all along has produced large quantities of "bonanza" ore, has again struck it rich at the bottom of the shaft. The extremely rich streak has now widened out to eight inches. The wonderful development of this mine is attracting great attention. It is an instance of the best goods being done up in small parcels—the vein being much narrower than any of the other working mines. Dr. Brent, from Alaska, is now testing the output at this mine. His return to this region gives much satisfaction.

The Beaver and Elgin mines continue developing in a satisfactory manner, and the "Shuniah Weachu" is occasionally striking bunches of rich ore, which give promise of eventual great results. Its neighbour to the west, the Silver Mountain "West End," is giving more than satisfaction to its fortunate owners.

The other silver mines are keeping hard at work, but have nothing special to note.

A public meeting has been called for the 19th December at Port Arthur to discuss railway matters and promote the construction of the first fifty or sixty miles through the silver region.

Mining men are impatient to learn the decision of the Privy Council of England with reference to the disputed ownership of minerals and timber in the Rainy River region. A decision was expected on the 18th inst.

F prospecting for both silver, gold and iron still continues brisk, no snow having fallen as yet to interrupt explorations.

The promised geological chart of this region from the Geological Survey office is eagerly looked for.

British Columbia.

The fire in the No. 2 level of the Southfield mine, Nanaimo, after causing a delay of nearly a week, is now considered extinguished. The work of replacing the fan, engine and house at the air-shaft is well under way, and it is confidently expected by the management that the Southfield mine will soon be again in full blast.

During the month of October seven cargoes of iron ore, amounting to 1,995 tons have been taken from Texada Island to Port Townsend, where it is being manufactured into pig-iron for shipment to San Francisco. The duty on this ore was \$1,496.25.

The Oyster Harbor Coal Mining Co. are about to continue their explorations for coal with a new and powerful Diamond drill which is now on the way from Chicago.

Mr. Samuel M. Robins, superintendent of the Vancouver Coal Company, has commenced the construction of new loading wharves in front of Cameron Island, and which will connect with the present wharves of the company. The new wharves will have a frontage of over 300 feet and will thus increase the loading facilities of the company fully 100 per cent. The increased output of coal from the company's several mines has made the necessity for greater loading facilities. The new wharves will be fitted up with the most modern appliances in the shape of shutes, etc., to ensure the quick dispatch of vessels.

An examination for managers' certificates, under the Coal Miners' Regulation Act, 1877, will be held at Nanaimo, on 1st December next.

Enough is known of Porcupine creek, which is 18 miles from Donald to prove it good placer ground. It is easily accessible from the railroad; the bed-rock in places is not deep; the dirt gives returns almost from the grass roots, and there is plenty of water. Every man who has returned from the camp reports the discovery claim as unquestionably rich—good for \$20 a day to the man at least. If that be true there are other claims likely to be just as good. At present some thirty claims have been staked off and recorded. Lumber is being whipsawed for sluice boxes, and the actual work of opening up claims is already under way.

At Tunnel mountain, three miles from Field work is being pushed in preparing the ground for working the mine successfully, and ore has been shipped to Vancouver. A tramway to conduct the mine with the railroad track is under way, the ore cars and other material being expected daily. John Barr, of Anthracite, has the contract for building bridges over the Kicking Horse between the mine and Field. The company have a large ore body in sight, and as soon as they begin shipping in earnest, the outside world will awaken to the fact that there is at least one producing mine in the Kootenay district.

This district is close to the Columbia river and four miles down stream from Jubilee mountain. W. J. Irying has several locations on the butte. On one of them, the Silver King, the ledge crops out to a width of over twenty feet. He has struck the foot wall but not the hanging wall. From an assay made July 12, at St. Paul, Mr. Irwin got a return of \$22.40 in silver, a trace of gold and 2½ per cent in copper to the

ton. The ore is easily worked, and if concentrated will undoubtedly pay largely. Mr. Irving would like to dispose of an interest in these claims, the money received to be expended in development work.

Reports are coming in of rich and extensive discoveries recently made in the mountains back of Windermere and on Toby creek. The ore carries a large percentage of copper, and from \$28 to \$93 in silver to the ton. The ranchmen of that section are all out on the mountains, either prospecting or doing assessment work.

The Petroleum Fields of Ontario.

ROBERT BELL, B. A., S.C., M. D., LL.D.*

The recent discoveries of natural gas and petroleum, by boring artesian wells in north-western Ohio and in western Pennsylvania, have given a new importance to the study of certain geological questions in connection with these products. In addition to the comfort and convenience arising from a cheap and abundant supply of natural gas for domestic purposes, the economy in power which it affords for manufacturers gives such an advantage to the towns fortunate enough to possess it that others cannot compete with them; and thus population and wealth are drawn to the sources of natural gas. A comparison of the Ohio gas and oil region with the petroleum field of Ontario, will, therefore, be interesting at the present time, in order that we may the better understand and generalize on what has been accomplished up to the present time, and be in a position to reap the benefits of the experience both of our neighbours and ourselves. The writer has endeavoured, in the following pages, to bring together and compare some facts and observations which may throw additional light on the subject. The present paper will also contain the latest statistics and other information in regard to the present condition of the petroleum industry of Ontario, including the methods employed in the production and refining of the oil. For the information of those not familiar with the history of the subject, it will be necessary first to notice very briefly, the discovery of petroleum in Ontario, and the progress of its economic development. More than forty years ago, the occurrence of petroleum in Western Canada and in the Gaspé Peninsula, was described in the early reports of the Geological Survey of the provinces and specimens of the oil, still in its Museum, were collected in both these regions by the late Sir William Logan. Although at that time no use for the substance was known in Canada, except as a supposed remedy for rheumatism and for spavin in horses, Sir William, with characteristic sagacity, foresaw that it might some day become of use in this country, as it had long ago proved to be in the east. About the beginning of 1860, following the introduction into the province of illuminating oils distilled from coal and shale, and when attention was recalled to the existence of natural oil and "gum-beds" in the County of Lambton, in the west, and in Gaspé in the east, some gentlemen visited our provincial geologist at Montreal for the purpose of obtaining information on the subject. Before entering on a discussion of the matter, Sir William took them to the show-case containing bottles of the dark fluid from both of the above regions and said, "Gentlemen, I have been waiting for you for the last twenty years," and then proceeded to give them the benefit of his knowledge of a matter with which he was, even then,

quite familiar, but which was new to almost every one else in this country.

The petroleum field of Ontario may be described, in a general way, as situated near the south-western extremity of the province, and on rocks of Devonian age, overlaid by a considerable thickness of drift. The "gum-beds" above referred to, are situated on the level and wet clayey land in the southern part of the Township of Enniskillen, and in the northern range of Dawn adjoining; and in 1860 some oil was obtained by digging wells in the clay at this locality—one of them sunk by James M. Williams, of Hamilton, reaching the rock.

On February 19th, 1861, W. James Shaw astonished the country by striking "rock-oil" in an artesian well which he sank in the shales and limestones beneath the drift clay at this place, to which the name of "oil springs" was now given, and which soon became a large village. It was here that the great-flowing wells were struck in the winter of 1860-61. The oil then escaped so rapidly that many thousands of barrels were lost before it could be controlled or the means provided for saving it. When the writer visited the locality in the spring of 1862, the trunks of the trees over a considerable extent of low ground, were blackened to a height of several feet by the oil which had temporarily flooded the neighborhood. The drift clay is here from seventy to eighty-five feet in thickness, and is followed by 170 to 185 feet of soft bluish drab shale or marl, the "soapstone" of the drillers. This is succeeded by a corniferous limestone, into which the wells were sunk only about ten feet, or to a total depth of 260 feet from the surface, where the best flow of oil was obtained. In 1886-87, many pumping wells were producing oil at a depth of about 100 feet below this level.

Soon after this discovery of petroleum in the underlying solid rock at Oil Springs, wells were sunk a little to the north of the centre of Enniskillen, where surface indications of oil had been observed. A considerable number of them proved to be flowing wells, and they afforded large quantities of petroleum for several months, but one by one they were all at length reduced to pumping wells, and as the number of borings increased, the average yield of each diminished, or the wells gave out altogether. Since that time, however, the total quantity of oil produced each year has been kept up or increased by constantly sinking larger numbers of new wells, the process of well-boring and pumping having been greatly simplified and cheapened.

The corniferous limestone, having been supposed to be the oil bearing stratum in Enniskillen, and the same formation being found to contain petroleum in its cavities in various parts of south-western Ontario, boring for oil in these rocks was soon commenced at random in numerous localities underlain by this formation before the distribution or mode of occurrence of the fluid was known to be governed by any law. These efforts resulted in finding petroleum in small quantities in widely separated places, as well as in the more productive amounts which were discovered at Bothwell, twenty-three miles south-east of Petrolia; in Oxford, east of London; and near Tilsonburg in Dereham, in the country between London and Long Point. The general want of ultimate success of these enterprises, except in Enniskillen, and the low price of oil, soon confined operations to that township. By degrees the area of the petroleum field came to be pretty accurately defined. Before this had been accomplished all sorts of theories had been indulged in as to the course which the supposed "oil-bearing belt" should take, and later as to the form and extent of the productive territory.

Meantime, the mode of occurrence of petroleum and its relations to geological structure were being investigated elsewhere.

The anticlinal theory in connection with the accumulation of gas and petroleum was first mentioned to the writer by the late Sir W. E. Logan in the autumn of 1860. He was then in the habit of comparing the filling of a soda-water bottle with gas and water to the process which he believed went on under the impervious strata of an anticlinal. But this idea seems to have originated with his colleague, Dr. T. Sterry Hunt, who mentioned it in a lecture delivered in Montreal and published in the *Gazette* of that city on March 1st, 1861. According to this hypothesis, gas and oil, following hydrostatic laws, accumulate at the highest points, or the domes, along anticlinal folds. All the transverse joints and fissures, and the spaces or channels between beds in deep-seated, unaltered, sedimentary rocks, are believed to be filled with water. The particles of gas and oil, as they are generated or become liberated in bitumeniferous rocks, naturally tend to rise through these waters unaided, perhaps, by earth-tremors and earthquake jars and shocks, such as are common in Canada and the northern United States. Downward projections and irregularities in the forms of the water spaces would arrest the gas and oil till these receptacles became filled to overflowing. Ultimately the lighter fluids from all points, following upward the slopes of the strata, would accumulate in largest quantities under the summit of the dome. The gas would take the highest place, the oil the next, while the water would be forced downward to an extent which would counterbalance the elastic force of the gas and the weight of the accumulated petroleum. The compressed gas would force back the oil and water alike from all the upper spaces. If the crown of such an anticlinal dome were tapped by a bore-hole from above, the gas would of course escape first, followed by the oil, and then by the water. This is what actually takes place in productive oil regions, and experience in Canada, the United States, Galicia, Baku, Burma, etc., has shown that the accumulations of petroleum are connected with anticlinals in the manner just described. The more extensive the anticlinal, as to either breadth or depth, the greater are the quantities of gas and oil which become collected, as the result of what may be called the larger drainage area. Profitable supplies of petroleum and gas are, therefore, not to be looked for on anticlinals of small extent. We know, from analysis of average samples, the approximate amount of oil which hydrocarbons in a given weight or bulk of rock, are capable of yielding by artificial means, but even the most moderate of these calculations show a proportion of oil and gas, far in excess of that which has ever been taken from the richest areas in productive fields; and it must be remembered, too, that most of this has, no doubt, been originally derived from other areas at greater or less distances from those actually drawn upon.

It is evident, therefore, that only a small proportion of the hydrocarbons actually present in petroleum-bearing strata ever become converted into the liquid or gaseous form by natural processes. As already stated, experience has proved the correctness of the anticlinal theory in regard to petroleum and gas; and this fact has become useful, not only to point out probable localities for their occurrence, but also to indicate large areas in which, from the attitude of the beds, it would be useless to look for them, although they may be constantly forming in the strata, the unfavorable indications for their ac-

cumulation being altogether due to geological structure. An essential condition for the retention of the petroleum in the situations which have been described, is that the reservoir must be covered by an impervious stratum, such as a considerable thickness of shales, clays or marls to hold them down. When this is not the case, or where the anticlinal fold has been too sharp and has become fissured, vast quantities of gas and oil have in many instances escaped to the surface, or have saturated the higher porous strata, as, for example, the remarkable and very extensive Petroleum-bearing sand-beds of the Athabaska district, in the North-West Territories of Canada. Another necessary feature for a productive oil-field is a sufficient body of porous or fissured and channelled rock for storing the accumulated oil. This may be the oil-producing formation itself, or it may be a non-productive rock lying above the source of the oil or below the impervious cap. Sometimes, leading fissures or joints and spaces between beds communicate with a vast number of other fissures or channels, and when one of these, or a branch closely connected with it, happens to be struck by a bore-hole, a great reservoir of the pent-up oil may be freely let out. In the commoner case of small fissures, it is now customary in Enniskillen, when the proper depth has been bored, to explode a torpedo in the bottom of the hole, in order to open new channels for the oil, before attempting to pump at all. The conditions necessary for a productive oil-field, are, therefore: (1.) An anticlinal or a dome-like structure on a large scale, in unaltered sedimentary strata. (2.) Deeply seated petroleum-forming rocks of considerable volume. (3.) A stratum of porous, fissured or channelled rock, which may be either coincident with or above the oil-producing beds, sufficiently thick to store the petroleum. (4.) An impervious layer of argillaceous rock to prevent its escape.

It is not to be supposed that petroleum may be found at all points along anticlinals over oil-producing strata, even where the conditions are favorable for sealing it down. In addition to the main anticlinal line, there must be a secondary upheaval, so as to produce a dome or an elevation, at the crown of which the oil may gather and rest. The process by which petroleum is thus concentrated may be compared to a reversal of the drainage of streams of water into a central basin or pond, the attitude of the petroleum basin being inverted, owing to the difference in the specific gravities of the fluids. On the map of a country, therefore, the forms of oil-producing areas are found not to follow long lines, but to occur in insulated areas, or to be "spotty," as this mode of distribution is called by the well-drillers. The oil wells at present worked in the township of Enniskillen belong to two distinct areas of permanently productive territory. That of Oil Springs is of small extent, and lies between the village of the same name and the south line of the township. The once celebrated "Hendricks Spouting-well" is just across this boundary line in the township of Dawn, but it is a little outside of the area which has proved to be continuously productive for twenty-seven years. The oil field of Petrolia begins a little to the south-east of the centre of Enniskillen, and extends in a west-north-westerly course, taking in the north-east corner of Moore, nearly to the centre of Sarnia township, a distance of twelve to thirteen miles, with a breadth of between two and three miles. The central belt of this area, one mile or less in width, is the most productive. A third oil-bearing area has lately been found a little to the north west of the centre of the

township of Euphemia. The first well in this "territory" was put down about July 1st, 1886, and up to November 1st of that year, nearly twenty wells had been sunk, but only four were in operation at the latter date, when about 1,000 barrels of oil had been produced. The petroleum is here found at a depth of 255 feet from the surface, in what is called the "upper show," which will be again referred to. The Euphemia and Oil Springs areas lie in a straight line, running west north-west, or parallel to the longer axis of the Petrolia area, but the general bearing of all these together would be north-west and south-east, or in the direction of the Bothwell area already alluded to.

(To be continued.)

Foreign Mining Laws.

Arthur Strauss.

(Continued from October issue.)

Frequent reference has been made in this paper to the State mining authorities, and it is essential to know how these authorities or mine courts are constituted. They consist of the Board of Trade, the mining courts, and the mine inspectors.

There is an inspector for each mining district, whose duty is more particularly to see that the laws of public safety, and other matters, are properly carried out. The inspectors are under the supervision of the Mining Courts, the Courts themselves, however, examine and grant all concessions. Appeal is allowed from the inspector's decision to the Courts, and in some cases from the Courts to the Board of Trade. No relations of the inspectors are allowed to hold shares in mines. The inspectors have to watch over the safety of all buildings and shafts, etc., as well as the preservation of life and health of the miners, etc. Should the inspector apprehend any danger, the Mining Courts send a warning to the committee of the mine, but should the danger be pressing, the inspector, has power to order immediate action for the prevention of accidents; if not obeyed, the inspector may carry out the necessary work himself, and charge the mine with the cost. In case of accident or death, the inspector has to be immediately informed of it. The inspector then orders immediate measures of relief, and steps to prevent further injury, and the mine as well as all surrounding mines, have to assist him in every way. The inspector has further to see that the mine is worked according to the plans, and his expenses are paid by the mine. Heavy fines are imposed if any of the rules and regulations are infringed.

If I have transgressed too much on your patience by giving all these technical details, my excuse must be that I consider the laws relating to mines and minerals of unusual importance, but especially to those in this country who are more immediately affected by them—to the prince as a large landed proprietor, and possessor of extensive mineral rights; to the landowner, who may be called upon at any moment to establish his right, resist obtrusion, abide by the acts of his agents, or to give compensation for injuries done by them or his workmen; to the adventurer, who expends his capital in exploring the hidden treasure of the soil; to the merchant, whose dealings must be conducted in accordance with the peculiar laws and customs which prevail in particular districts; and to the labourer and artisan, who, on the one hand, are subjected to civil and criminal proceedings for acts of omission as well as commission, wilfully incurred in the course of their employment, and, on the other, have a remedy for grievances or

injuries to which they may be subjected by oppression, negligence, or commands of their employers. From those, indeed, who have neither time nor capacity to enlarge their views beyond the contracted sphere in which they are appointed to move, a superficial acquaintance with the laws under which they labour is all that can be expected, but for those on whom greater obligations or duties are imposed, a knowledge of the law as it exists in all foreign countries is, in my humble opinion, indispensable.

Mr. John Tonkin: Are dues paid abroad on net or gross amount?

Mr. Strauss: On net.

Mr. W. Rowe: That means on profits?

Mr. Strauss: Yes, after costs are deducted.

That is generally the case all over the continent.

Captain Charles Craze related his experience of mining in Germany. There the Government inspectors met the managers of a Government district and arranged dues. For instance, in 1875 and 1876 lead was £12 a ton. The Government authorities met the managers of the district, and, instead of fixing £12 a ton, fixed £10 as a basis of calculation. They also allowed 7½ groschens (or 15s.) per ton for dressing, so that dues were really paid on £9. 5s., when £12 was being received for the ores. The dues paid were two per cent. on £9. 5s.

Mr. James Wickett: That is not on profits?

Captain Craze: No, it is on all ores raised, that is on gross receipts.

Mr. Strauss said the Government gave the miners the option, either to pay 2 per cent. or to agree to fix upon a certain stated sum.

Captain Josiah Thomas: Is the percentage never above 2 per cent.?

Captain Craze: No, never.

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1 Real Estate worth	1,000	1,000
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60 Furniture Sets	100	6,000
200 Gold Watches	50	10,000
1000 Silver Watches	10	10,000
1000 Toilet Sets	5	5,000

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S. E. LEFEBVRE, Secretary.

Office: 19 St. James St., Montreal, Can.

Mr. H. P. Vivian: Do the Government inspectors ever interfere with the working of the mines?

Mr. Strauss: No—or very little. The managers, knowing how strict the laws are, usually conform to them. There is very little clashing. Captain Craze said when he went to Germany he found the shaft in the mine was sunk twelve fathoms perpendicularly. At the 14 they struck the lode, which had an underlie north of three feet in one fathom. They sunk on the course of the lode. When the inspector visited the mine he objected to this. Captain Craze understood the matter was optional. The inspector wanted the shaft to be sunk down-right. The inspector fetched two other gentlemen from Bonn, and

they said, "How will you fix your skip-roads and your pump lifts if you do not sink down-right," and he (Captain Craze) explained to them how they overcame that difficulty in Cornwall, and the result was, the inspector did not compel them to sink a down-right shaft, and they continued on the underlie, but the inspector could, and did, compel them to fill up all old workings with stuff sent down from the surface.

Mr. Strauss said much that Captain Craze had referred to was alluded to in his paper. For instance, he had said, "In case of any change in the mode of working, notice must be sent to the authorities."

* Read before the Royal Society of Canada.

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The property formerly belonged to the Montreal Plumbago Mining Company, and was worked successfully for several years, until the company's mill was destroyed by fire, but the mill dam remains almost uninjured, and there are on the property several houses, sheds, etc., built for various purposes when mining operations were carried out.

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upon the property are regarded as amongst the richest and most extensive in the Dominion. As to the quality of the Plumbago, it has been extensively used in the manufacture of crucibles, lubricating leads, stove polish, etc., etc., and given unbounded satisfaction. This is established by the experience of consumers, and by a certificate from the celebrated Battersea Crucible Works, London, England, a copy of which is open for inspection.

MICA

has also been discovered in quantities.

The lands are in the Phosphate region, and recent prospecting has disclosed a rich and extensive deposit of this mineral. There are unrivalled facilities for transporting the ore to and from the mines by the Ottawa River and C. P. Railway. Distance from mines to Railway Station 6 miles. Good road.

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OTTAWA.



Department of Inland Revenue.

An Act Respecting Agricultural Fertilizers.

The public is hereby notified that the provisions of the Act respecting AGRICULTURAL FERTILIZERS came into force on the 1st of January, 1886 and that all Fertilizers sold thereafter require to be sold subject to the conditions and restrictions therein contained—the main features of which are as follows:

The expression "fertilizer" means and includes all fertilizers which are sold at more than TEN DOLLARS per ton, and which contains ammonia, or its equivalent of nitrogen, or phosphoric acid.

Every manufacturer or importer of fertilizers for sale, shall, in the course of the month of January in each year, and before offering the same fertilizer for sale, transmit to the Minister of Inland Revenue, carriage paid, a sealed glass jar, containing at least two pounds of the fertilizer manufactured or imported by him, with the certificate of analysis of the same, together with an affidavit setting forth that each jar contains a fair average sample of the fertilizer manufactured or imported by him; and such sample shall be preserved by the Minister of Inland Revenue for the purpose of comparison with any sample of fertilizer which is obtained in the course of the twelve months then next ensuing from such manufacturer or importer, or collected under the provisions of the Adulteration Act, or is transmitted to the chief analyst for analysis.

If the fertilizer is put up in packages, every such package intended for sale or distribution within Canada shall have the manufacturer's certificate of analysis placed upon or securely attached to each package by the manufacturer; if the fertilizer is in bags, it shall be distinctly

stamped or printed upon each bag; if it is in barrels, it shall be either branded, stamped or printed upon the head of each barrel or distinctly printed upon good paper and securely pasted upon the head of each barrel, or upon a tag securely attached to the head of each barrel; if it is in bulk, the manufacturer's certificate shall be produced and a copy given to each purchaser.

No fertilizer shall be sold or offered or exposed for sale unless a certificate of analysis and sample of the same shall have been transmitted to the Minister of Inland Revenue and the provisions of the foregoing sub-section have been complied with.

Every person who sells or offers or exposes for sale any fertilizer, in respect of which the provisions of this Act have not been complied with—or who permits a certificate of analysis to be attached to any package, bag or barrel of such fertilizer, or to be produced to the inspectors to accompany the bill of inspection of such inspector, stating that the fertilizer contains a larger percentage of the constituents mentioned in sub-section No. 11 of the Act than is contained therein—or who sells, offers or exposes for sale any fertilizer purporting to have been inspected, and which does not contain the percentage of constituents mentioned in the next preceding section—or who sells or offers or exposes for sale any fertilizer which does not contain the percentage of constituents mentioned in the manufacturer's certificate accompanying the same, shall be liable in each case to a penalty not exceeding fifty dollars for the first offence, and for each subsequent offence to a penalty not exceeding one hundred dollars. Provided always that deficiency of one per centum of the ammonia, or its equivalent of nitrogen, or of the phosphoric acid, claimed to be contained, shall not be considered as evidence of fraudulent intent.

The Act passed in the forty-seventh year of Her Majesty's reign, chaptered thirty-seven and entitled, "An Act to prevent fraud in the manufacture and sale

of agricultural fertilizers," is by this Act repealed, except in regard to any offence committed against it or any prosecution or other act commenced and not concluded or completed, and any payment of money due in respect of any provision thereof.

A copy of the Act may be obtained upon application to the Department of Inland Revenue, as well as a copy of a Bulletin which it is proposed to issue in April, 1888, concerning the fertilizers.

E. MIALL,
15th Dec, 1887. Commissioner.



ONTARIO

Mining Regulations.

The following summary of the principal provisions of the General Mining Act of the Province of Ontario is published for the information of those interested in mining matters in the Algoma District, and that part of the Nipissing District north of the Mattawan River, Lake Nipissing and French River.

Any person or persons may explore for mines or minerals on any Crown Lands surveyed or unsurveyed, not marked or staked out or occupied.

The price of all lands sold as mining locations or as lots in surveyed townships is two dollars per acre cash, the pine timber being reserved to the Crown. Patentees or those claiming under them may cut and use such trees as may be necessary for building, fencing or fuel, or for any other purpose essential to the working of mines.

Mining locations in unsurveyed territory shall be rectangular in shape, and the bearings of the outlines thereof shall be due north and south, and due east and west astronomically, and such locations shall be one of the following dimensions, viz: eighty chains in length by forty chains in width, containing 320 acres, or forty chains square,

containing 160 acres, or forty chains in length by twenty chains in width, containing 80 acres.

All such locations must be surveyed by a Provincial Land Surveyor, and be connected with some known point or boundary at the cost of the applicant, who must file with application surveyor's plan, field notes and description of location applied for.

In all patents for mining locations a reservation of five per cent. of the acreage is made for roads.

Lands patented under the Mining Act are free from all royalties or duties in respect to any ores or minerals thereon, and no reservation or exception of any mineral is made in the patents.

Lands situated south of the Mattawan River, Lake Nipissing and French River are sold under the Mining Act at one dollar per acre cash.

Affidavits showing no adverse occupation, improvement or claim should accompany applications to purchase.

T. B. FARDEE,
Commissioner
Department of Crown Lands, Toronto.



SEALED TENDERS addressed to the undersigned, and endorsed "Tender for McGregor's Creek," will be received at this office until Friday, the 23rd November next, for the construction of pile protection work at McGregor's Creek, town of Chatham, Kent County, Ontario, in accordance with a plan and specification to be seen at the Department of Public Works, Ottawa, and on application to Mr. A. McDonnell, C.E., P.L.S., Chatham.

Tenders will not be considered unless made on the form supplied and signed with the actual signatures of tenderers.

An accepted bank cheque, payable to the order of the Minister of Public Works, equal to five per cent. of amount of tender, must accompany each tender. This cheque will be forfeited if the party declines the contract, or fail to complete the work contracted for, and will be returned in case of non-acceptance of tender.

The Department does not bind itself to accept the lowest or any tender.

By order,
A. GOBEIL,
Secretary.

Department of Public Works,
Ottawa, 29th October, 1888.

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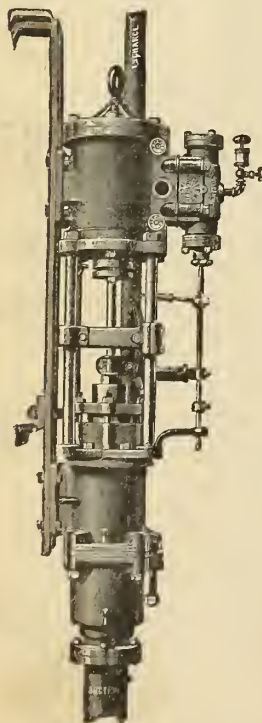
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Mining Regulations

TO GOVERN THE DISPOSAL OF

Mineral Lands other than Coal Lands, 1886.

THESE REGULATIONS shall be applicable to all Dominion Lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, iron or other mineral deposits of economic value, with the exception of coal.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein, either by surface or subterranean prospecting for mineral deposits, with a view to obtaining under the Regulations a mining location for the same but no mining location or mining claim shall be granted until the discovery of the vein, lode or deposit of mineral or metal within the limits of the location or claim.

QUARTZ MINING.

A location for mining, except for iron on veins, lodes or ledges of quartz or other rock in place shall not exceed forty acres in area. Its length shall not be more than three times its breadth and its surface boundary shall be four straight lines, the opposite sides of which shall be parallel, except where prior locations would prevent, in which case it may be of such a shape as may be approved of by the Superintendent of Mining.

Any person having discovered a mineral deposit may obtain a mining location therefor, in the manner set forth in the Regulations which provides for the character of the survey and the marks necessary to designate the location on the ground.

When the location has been marked conformably to the requirements of the Regulations, the claimant shall within sixty days thereafter, file with the local agent in the Dominion Land Office for the district in which the location is situated, a declaration or oath setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as aforesaid; and shall, along with such declaration, pay to the said agent an entry fee of FIVE DOLLARS. The agent's receipt for such fee will be the claimant's authority to enter into possession of the location applied for.

At any time before the expiration of FIVE years from the date of his obtaining the agent's receipt it shall be open to the claimant to purchase the location on filing with the local agent proof that he has expended not less than FIVE HUNDRED DOLLARS in actual mining operations on the same; but the claimant is required, before the expiration of each of the five years, to prove that he has performed not less than ONE HUNDRED DOLLARS' worth of labor during the year in the actual development of his claim, and at the same time obtain a renewal of his location receipt, for which he is required to pay a fee of FIVE DOLLARS.

The price to be paid for a mining location shall be at the rate of FIVE DOLLARS PER ACRE, cash, and the sum of FIFTY DOLLARS extra for the survey of the same.

No more than one mining location shall be granted to any individual claimant upon the same lode or vein.

IRON.

The Minister of the Interior may grant a location for the mining of iron, not exceeding 160 acres in area which shall be bounded by north and south and east and west lines astronomically, and its breadth shall equal its length. Provided that should any person making an application purporting to be for the purpose of

mining iron thus obtain, whether in good faith or fraudulently, possession of a valuable mineral deposit other than iron, his right in such deposit shall be restricted to the area prescribed by the Regulations for other minerals, and the rest of the location shall revert to the Crown for such disposition as the Minister may direct.

The regulations also provide for the manner in which land may be acquired for milling purposes, reduction works or other works incidental to mining operations.

Locations taken up prior to this date may, until the 1st of August, 1886, be re-marked and re-entered in conformity with the Regulations without payment of new fees in cases where no existing interests would thereby be prejudicially affected.

PLACER MINING.

The Regulations laid down in respect to quartz mining shall be applicable to placer mining as far as they relate to entries, entry fees, assignments, marking of localities, agents' receipts, and generally where they can be applied.

The nature and size of placer mining claims are provided for in the Regulations, including bar, dry bench creek or hill diggings, and the RIGHTS AND DUTIES OF MINERS are fully set forth.

The Regulations apply also to

BED-ROCK FLUMES, DRAINAGE OF MINES AND DITCHES.

The GENERAL PROVISIONS of the Regulations include the interpretation of expressions used therein; how disputes shall be heard and adjudicated upon; under what circumstances miners shall be entitled to absent themselves from their locations or diggings, etc., etc.

THE SCHEDULE OF MINING REGULATIONS

Contains the forms to be observed in the drawing up of all documents such as:— "Application and affidavit of discoverer of quartz mine." "Receipt for fee paid by applicant for mining location." "Receipt for fee on extension of time for purchase of a mining location." "Patent of a mining location." "Certificate of the assignment of a mining location." "Application for grant for placer mining and affidavit of applicant." "Grant for placer mining." "Certificate of the assignment of a placer mining claim." "Grant to a bed rock flume company." "Grant for drainage." "Grant of right to divert water and construct ditches."

Since the publication, in 1884, of the Mining Regulations to govern the disposal of Dominion Mineral Lands the same have been carefully and thoroughly revised with a view to ensure ample protection to the public interests, and at the same time to encourage the prospector and miner in order that the mineral resources may be made valuable by development.

COPIES OF THE REGULATIONS MAY BE OBTAINED UPON APPLICATION TO THE DEPARTMENT OF THE INTERIOR

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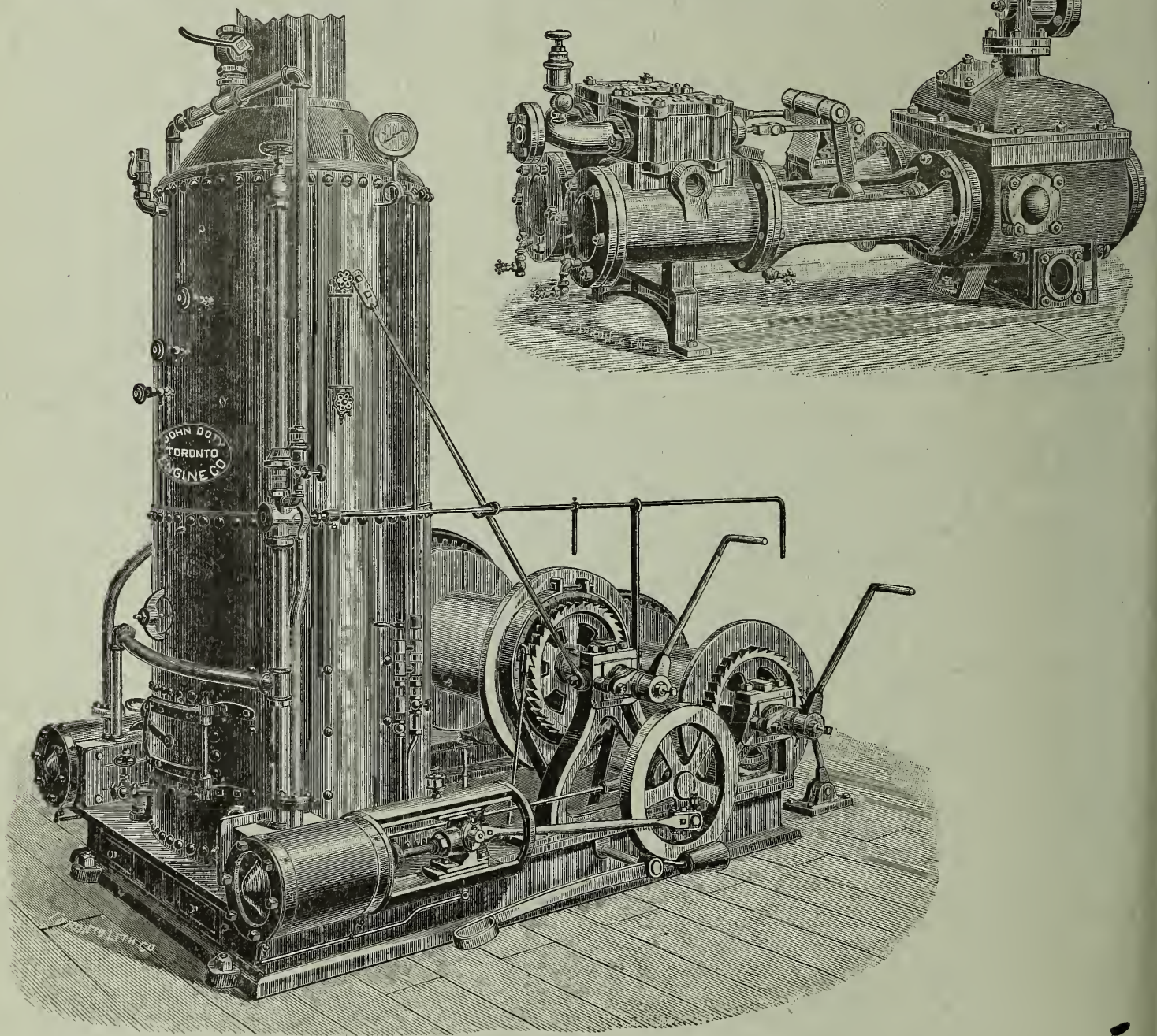
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1888.—OTTAWA, DECEMBER—1888.

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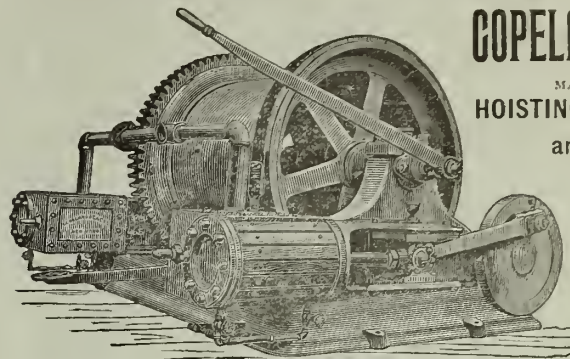


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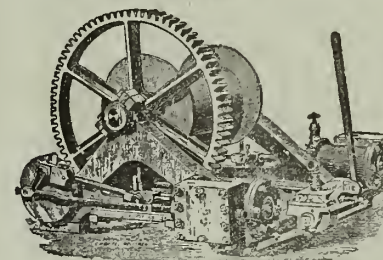
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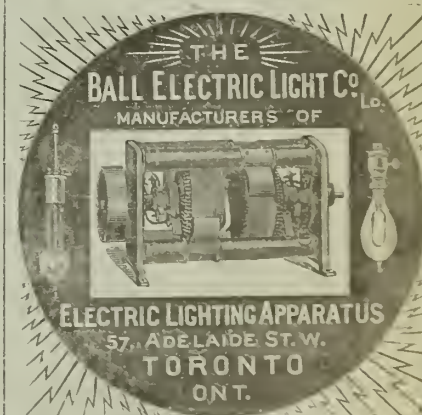
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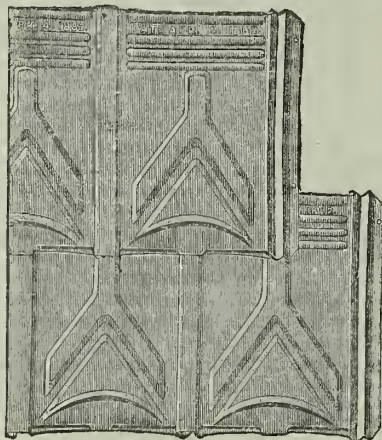
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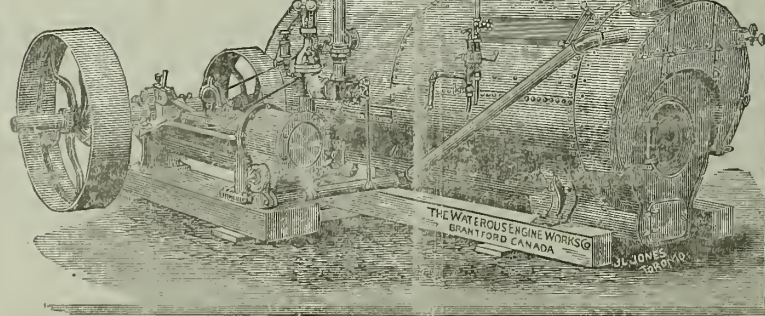
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The Sulphur Mines of Sicily.—The United States Consul at Palermo, states, in a recent report, that although sulphur exists more or less in all countries, Sicily is the only place where it is produced on a large scale, and that island accordingly commands the market. The mines have been worked there for over 300 years, but until 1820 the export was confined within narrow limits. At present the number of mines in Sicily is about 300, nearly 200 of which, however, are said to be destined to stop shortly owing to want of capital. It is estimated that the Sicilian sulphur deposits amount to 30,000,000 tons, and the annual production is about 400,000 tons. If the former estimate be true, and the rate of production is maintained, Sicily will be denuded of sulphur in about 75 years. The royalties vary from 12 to 45 per cent., according to the quality of the ore and the facilities for producing the sulphur: 25 per cent. may be taken as the average. There is a land tax of 36 per cent. of the net income, and the export duty is about 8s. per ton. The lessees receive from 10 to 40 per cent. of the sulphur produced. The external indications of the presence of the sulphur are the appearance of gypsum and sulphurous springs. Frequently several borings have to be made to get at the seam, but when it is found the passages or galleries follow it, and are therefore most irregular. When the miners detach the ore from the surrounding material, vast cavities are often 1-ft which have to be supported on pillars of rock, which often give way, with disastrous results. Water is the greatest difficulty in the way of the miner, and pumps are constantly necessary. At one time miners were allowed to dig where they pleased, with the result that one mine often fell into or upon another, and accordingly a law has been passed requiring plans of the mines to be deposited in a public office. The total number of mining laborers is said to be 25,000; as a rule they can neither read nor write, and are described as indolent and dishonest. They frequently sleep in the mines or the open air, according to the weather, and they violently oppose a relief fund for the families of those who die in the service, because from 1 to 2 per cent. is deducted from their wages to maintain it. There are seven different qualities of sulphur, which are decided by color and not by test. Between 1840 and 1860 the Sicilian sulphur industry was at its zenith; it was free from official interference or taxation, and sulphuric acid was derived exclusively from the sulphur. But science soon discovered that it could be obtained from iron pyrites, and, indeed, it is said that two-thirds of the sulphuric acid used in England is manufactured from pyrites. The decrease in price produced by this discovery caused many of the mines to suspend operations. —*Colliery Engineer.*

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A three-days' sale by auction of the entire vessel and her fittings has taken place at Liverpool. The catalogue contained 893 lots, and as a rule satisfactory prices were obtained. The hull and fittings realized over £43,000, the copper bringing \$2,960, the gun metal, etc., £4,800, brass £3,980, lead £4,185, outer iron plates £12,500, inner iron plates, beams and rivets £12,300, and anchors about £300. The engines and engine fittings sold for about £10,000 in addition, bringing up the total to more than £50,000. The breaking up of the steamer will commence on January 1st, will occupy a year, and will, it is estimated, cost in labor from 10s. to 15s. per ton of material.

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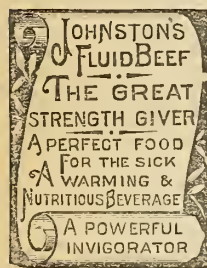
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12th, 1888.

Coal in the North-West.—Mr. Maltby, an eminent mining engineer of Chicago, who has been prospecting for coal and examining locations in Alberta and British Columbia during the summer for the C. P. R. Company, was in the city Tuesday on his way to Montreal to submit his report to the directors. Mr. Maltby states that he has been working chiefly on the Crowfoot Creek, fifteen miles east of Gleichen, and a few miles north of the C. P. R. A shaft was struck in that locality a couple of years ago, but as it filled up with water and as the operators had no machinery to pump it out the work was abandoned. Mr. Maltby continued this shaft to a depth of 470 feet, penetrating four seams of coal, the first being eighteen inches thick, the second nine inches, and the third and principal one nine feet. Mr. Maltby mined the last mentioned seam and took out several car loads of coal, which were tested in the C. P. R. locomotives with highly satisfactory results. This bed of coal, Mr. Maltby says, extends from near the C. P. R., where outcroppings are seen, to the Red Deer River, a distance of thirty-five or forty miles. The coal is similar to the Lethbridge coal, but while it has a strong blaze, it does not emit any smoke, and is suitable for steam or domestic purposes. Mr. Maltby made an examination of the coal at Cochrane, where a company has been mining on the outcroppings. He says that good coal will not be obtained there until deeper shafts are sunk to the beds that have not been affected by the upheaval of the mountains. He also says that the Canada Anthracite Company made a mistake in working the outcroppings instead of sinking deep shafts. Mr. Maltby made an examination of land in the vicinity of Vancouver, and expresses the opinion that vast coal beds exist there, but at a depth of 1,000 feet. He thinks it is the same bed that crops out on Vancouver Island. Being asked as to the probable extent of the coal beds in the North-West, Mr. Maltby said there was sufficient coal in the country to supply Canada with fuel for centuries. The C. P. R. will probably open mines in the Crowfoot district next year. Mr. Maltby has been engaged for years in coal mining in England and the United States, and understands the practical as well as the scientific branch of the business. He is now superintendent of several mines in Illinois.

Forced Draught and Coal Consumption.—A forced draught invention calculated to lead to a diminished consumption of coal is at present attracting some attention in the shipping trade. The inventor is Alderman Wilson, of Stockton, England, who has just sent out a first installation to the order of the Irrawaddy Flotilla Company, British Burmah, which has the largest fleet of steamers in the world. An installation has been in operation on board the Cunard Company's steamer "Servia" during the past twelve months, and it has not only increased the speed of the vessel, but has diminished the quantity of coal used between New York and back to the extent of 195 tons. In consequence of this result the Cunard Company have ordered a supply of the installation for all the boats in their fleet. Ald. Wilson's invention, it may be remarked, is one of many that have been recently produced in the direction of coal economy on board steamers. The results in several instances are stated to have been very satisfactory, and in some cases it is anticipated that a market for the worst classes of coal will in the near future be forthcoming.

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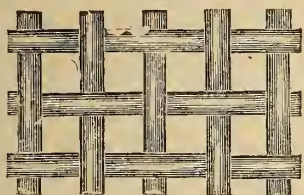
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The Vancouver Coal Mining and Land Company (Limited).

The semi-annual general meeting of the above company was held at the Cannon street Hotel, London, on Monday, 3rd ult., under the presidency of Mr. John Galsworthy.

The Chairman moved the adoption of the report and accounts, and said the former showed that in the past half-year they had made a profit of £20,858, after deducting £1,937 for repairs and maintenance. That was a most satisfactory state of things, and he did not think they had ever had so much profit in any half-year before. The output for the half-year had exceeded anything they had had before; it amounted to 87,000 tons, and the profits on those sales realized about 5s. a ton. The Chairman then described the state of the shafts and levels at the present time, from which it appeared that the No. 1 north level, which had been reported as running out of coal, was still unfavourable. No. 3 north level in the No. 1 shaft, which also had run out, had now got to a seam of 6 feet good coal. At the No. 2 shaft, they would remember, they had been boring to see if they could get at coal supposed to be underneath, and a telegram which had been received that day told them that at the 590 feet, where they were down, they were in promising conglomerate. With regard to the South Field scope, from whence they had been getting the large bulk of their coal, in the No. 1 shaft No. 3 north level there was 6 feet of good coal; No. 1 level was unfavorable; No. 4 South Field Stope was in poor ground; No. 2 and No. 3 were going well. In the North Field shaft they had got to the bed of rock, and purposed putting a shaft down, and hoped to strike the seam which Mr. Dunsmuir had got not very far off, which was an excellent one. As to the bore-holes, there were seven in the South Field, indicating coal ranging from 1 to 14 feet. In the East Field, where the shaft was, there were four bore-holes, ranging from 6 feet to 9 feet of coal. There were three bore-holes in the West Field, and there was no coal found yet. In the Gabriola they had sunk down to 1,950 feet, and were still in shale, and the coal supposed to underlie it was at any rate some distance ahead. Referring to the balance-sheet, it would be observed that the reserve fund and the insurance had been increased, and the estate fund now amounted to 12,000%, while the land sales reserve amounted to 10,000%. On the other side of the account it would be seen that they had nearly eliminated a deficit balance, bringing it from 20,985% to 127%. The directors had issued 5,000 new shares at a discount, but that turned out, according to decisions given to be illegal; therefore that 12,500% must be provided some day, and it could only properly come out of profits. At the present moment they could only keep the item there and keep the profits available for it when they could deal with it. The motion was seconded by Mr. Joseph Fry and carried.

The meeting was then made special, and the chairman submitted a provisional agreement for bonding the company's property to Messrs. John Rosenfeld & Sons. Referring to the property, he admitted it was an excellent one, but it wanted a capital of £100,000 or £150,000 at the back of any one who wished to make it what it ought to be. They could not get that money from the shareholders. They had tried once, and had the greatest difficulty to get £37,000, and he was sure if they tried to get £50,000 they would fail. That being so, it was not surprising that they should enter into this agreement to give the opportunity to Messrs. Rosenfeld to find the capital to work the property, especially at a price which he ventured to say was an excellent one. The price which they would give the shareholders, supposing Messrs. Rosenfeld took the property to-morrow, would be £12 per share, so that after the misfortunes the company had had, including the explosion, they would get their capital back with a bonus of £2. The acreage of the freehold land was 19,506. Then they had bonded on the other side various other estates which amounted to 23,000 acres, but before they could call them their own they would have to pay £26,000. They had also bonded some other small estates, upon which they would have to pay nearly £12,000 to get them. They had been selling town lots at £300 an acre, but pending the purchase being completed under the agreement, all the profits, all the sales, and all the capital which might be laid out, and all additions of exploration would be added to the price to be paid by the purchasers. They might sell the whole of the town lots at any price they liked and keep the money. The shipments of coal up to the present time since June had been 121,000 tons. In conclusion, the Chairman stated that Mr. Rosenfeld had made this proposition:—"That assuming he formed a combination to carry on the property, he would offer to the shareholders of this company one-third of the capital upon the scale amount which he himself paid for the property." A motion was subsequently put and carried agreeing with these terms.

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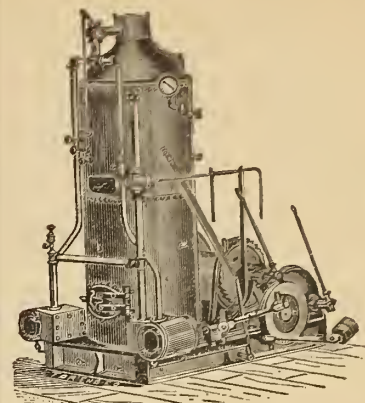
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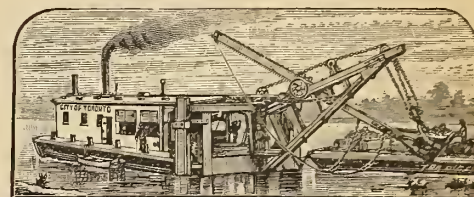
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MINING REVIEW OFFICE.

The Duty on Mining Machinery.

The question of the remission of the duty on mining machinery having been brought before the Minister of Customs, Mr. Powell said that the matter was one of great importance to every province in the Dominion. He recognized that the mining industry should be encouraged and every facility afforded for the development of our great mineral resources that could legitimately be given. The Government has the whole question of the free admission of mining machinery under consideration. At the present time the Minister recognizes that certain implements and classes of machinery used in mining are at present being made in Canada, that this interest is rapidly being extended, and that great care would have to be exercised to see that this industry was not interfered with.

Asbestos in the United States.

From the "Mineral Resources of the United States" for 1888, just issued, we note that the total product for last year hardly exceeded 150 tons, worth \$4,500. In addition several hundred tons of fibrous actinolite were used for weighting paper. The figures of the production of asbestos during recent years have been: 1882, 1,200 tons, value \$36,000; 1883, 1,000 tons, value, \$30,000; 1884, 1,000 tons, value \$30,000; 1885, 300 tons, value \$9,000; 1886, 200 tons, value, \$6,000; 1887, 150 tons, value \$4,500. No wonder Cousin Jonathan is anxious to acquire some of our rich asbestos lands.

The Phosphate Season of 1888.

The shipping season for phosphate has now closed, and a review of its principal features may be taken.

The total export from Montreal has been 14,392 tons, 384 bags, 30 barrels, or in round figures, 14,432 tons, a falling off from last year, which is mainly owing to the difficulty of transportation on the Lievres river. This will eventually be obviated by the canal now being constructed at the Little Rapids. Work on this was delayed during the best months of the summer in consequence of a lawsuit arising out of a large claim against the Government for right of way. A show of phosphate was struck by the contractors during their excavations, before the price had been settled, and the owner, finding that a "phosphate mine" was to be destroyed, raised his price

some \$50,000. He, however, lost his suit, and the phosphate was soon cut through, and now work is proceeding with a prospect of completion in 1890. In consequence of this trouble in bagging phosphate, considerable quantities have been held over.

SHIPMENTS.

The following have been the shipments of phosphate from Montreal to ports in United Kingdom, France and Germany during season of navigation for 1888, as per Custom House manifests:

Date.	Name of Vessel	Destination.	Shippers.	Tons.
May 17	Sully	Havre	Lomer, Rohr & Co.	30
" 18	Oxenholme	Liverpool	Wilson & Green	520
" 22	Baumwall	Hamburg	Lomer, Rohr & Co.	150
" 25	Durham City	Liverpool	Wilson & Green	180
" 25	Washington C's	London	Lomer, Rohr & Co.	230
" 31	Cynthia	Glasgow	"	384
June 1	Cremon	Hamburg	"	210
" 2	Caropus	Liverpool	Wilson & Green	49
" 7	Dominion	Avonmouth	Millar & Co.	317
" 8	Holsten	Hamburg	Wilson & Green	100
" 9	Bonnington	Dublin	Lomer, Rohr & Co.	310
" 15	Wandrahau	Hamburg	Wilson & Green	168
" 22	Lake Winnipeg	Liverpool	Lomer, Rohr & Co.	300
" 23	Govino	London	"	480
" 31	Fremona	do	Millar & Co.	318
" 30	Lake Superior	Liverpool	Lomer, Rohr & Co.	100
" 30	Glasbrook	Hamburg	Wilson & Green	149
July 4	Oxenholme	Liverpool	"	657
" 6	Cynthia	Barrow	Lomer, Rohr & Co.	150
" 10	Circle	Glasgow	"	150
" 17	Colina	do	"	200
" 20	Escalona	London	"	220
" 25	Jas. L. Harway	Bristol	"	201
" 25	Canopus	Liverpool	Wilson & Green	407
Aug. 1	Bothal	London	Millar & Co.	312
" 1	Murelano	do	Wilson & Green	170
" 4	Cremon	Antwerp	"	127
" 4	do	do	Lomer, Rohr & Co.	125
" 6	Lake Superior	Liverpool	"	286
" 13	Fremona	London	"	220
" 13	Chateau Leville	do	"	420
" 13	do	do	Millar & Co.	100
" 13	Lake Nepigon	Liverpool	"	130
" 17	Oxenholme	do	Lomer, Rohr & Co.	335
" 17	do	do	Wilson & Green	435
" 21	Henry IV.	London	Millar & Co.	65
" 21	do	do	Lomer, Rohr & Co.	400
Sept. 15	Canopus	Liverpool	Millar & Co.	75
" 24	Lake Huron	do	Wilson & Green	138
" 27	Fremona	London	Millar & Co.	165
" 27	do	do	Wilson & Green	250
" 24	Lake Huron	Liverpool	"	138
" 27	Ripon City	London	Millar & Co.	130
" 27	do	do	Wilson & Green	198
Oct. 3	Oxenholme	Liverpool	"	657
" 4	Cremon	Hamburg	"	365
" 9	Dominion	Avonmouth	Millar & Co.	225
" 10	Sarnia	Liverpool	Lomer, Rohr & Co.	55
" 15	Lake Superior	do	Wilson & Green	220
" 15	Circle	Glasgow	"	215
" 15	do	do	Lomer, Rohr & Co.	200
" 16	Oregon	Liverpool	"	190
" 25	Montreal	do	"	120
" 25	do	do	Wilson & Green	202
" 27	Ontario	Avonmouth	Millar & Co.	165
" 30	Valcouver	Liverpool	"	55
" 30	do	do	Lomer, Rohr & Co.	100
" 31	Colina	Glasgow	Wilson & Green	200
" 31	Barcelona	London	"	139
Nov. 7	Concordia	Hamburg	Lomer, Rohr & Co.	100
" 7	Concordia	Glasgow	Wilson & Green	170
" 8	Toronto	Liverpool	Millar & Co.	85
" 10	Avlona	London	"	221
" 10	Glasbrook	Hamburg	Wilson & Green	215
" 14	Fremona	London	"	190
" 14	do	do	Lomer, Rohr & Co.	100
" 14	Sarnia	Liverpool	Millar & Co.	30
Total tons				14,432

RECAPITULATION.

	Tons.	Bags.	Barrels.
Wilson & Green, Montreal	6,619		
Lomer, Rohr & Co.	5,381	384	30
Millar & Co.	2,392		
Point of Shipment.			
Hamburg	1,536		
Liverpool	5,890		
London	4,422		
Glasgow	1,125	384	
Dublin	310		
Avonmouth	707		
Barrow	150		
Antwerp	252		
Havre			30
Total Exports from Montreal			
	14,392	384	30

EXPORTED TO UNITED STATES,

(Buffalo, Chicago, and Philadelphia), as per Shippers, Station Agents, and U. S. Consulate returns.

From	Quantity.
Ottawa Valley	2,000 Tons.
Kingston District	814 "
Total	2,814 Tons.

SUMMARY OF EXPORTS FOR 1888.

	Tons.
To European points	14,432
To United States points	2,814
Home Consumption	200

Total Exports 17,446

OUTPUT.

The output from the various mines to date may be fairly stated to be as follows:

DU LIEVRE DISTRICT.

	Tons.
Phosphate of Lime Co.	7,500
Canadian Phosphate Co.	4,000
Dominion Phosphate Co.	3,500
Ottawa Phosphate Co.	2,500
W. A. Allan	200
Total	17,700

TEMPLETON DISTRICT.

Blackburn mines	2,500
Templeton & Blanche River Co.	170
Jackson Rae	170
Canada Industrial Co.	150
Total	2,990

PERTH DISTRICT.

Anglo Canadian Co.	600
Total	600

KINGSTON DISTRICT.

Capt. Boyd Smith	1,500
Jas. Foxton	500
Total	2,000

Total output for 1888, tons 23,290

FREIGHTS.

Freights during the season have been at 6s. to 7s. per ton until the fall, when they advanced to 12s. 6d. for London. But the break in the Cornwall canal detained cargo from the steamships in Montreal, and they accepted phosphate at 2s. 6d. for Liverpool in order to get away. This enabled some phosphate to be shipped that would otherwise have been held over. Deal freights that opened in the spring at 40s., advanced in the fall to 80s. and greatly checked shipments, so that the supply of ballast tonnage for phosphate from this source was much reduced. It is estimated that 50,000 tons of lumber has been held over in the St. Lawrence, and a large fleet of vessels may be expected next year. This promises cheap phosphate freights.

MARKETS.

Markets abroad have been steady, with some tendency to increase at the close of the season, owing to high freights, which caused a decided advance in the price of Carolina phosphate. Prices for 80 per cent. Canadian were 11d. to 1s. per unit at the beginning of the season, and considerable sales were made at these figures.

Later on the demand turned towards lower grade phosphates, which had been quite neglected the year before. Sales were made of qualities as low as 65 per cent. The markets closed in England at about 9d. per unit for 70 per cent. and 10d. for 75 per cent. Aruba phosphate has been selling in competition with Canadian, and the French phosphates from the Somme district have been largely used in England. The supply of these threatens to be exhausted within two years. The English farmers are distinctly better off than they were last year, and they will be better able to buy artificial manures. Sales have already very much increased. There seems, therefore, good reason to expect better prices and a larger demand for all grades of Canadian phosphate.

The American market for pulverized phosphate of low grade is extending, and a good trade in this direction is assured.

New Discoveries.

The unscrupulous speculator who "booms" properties that he knows to be worthless, and the too gullable newspaper which accepts as gospel his plausible stories, and extensively puffs his reported finds of minerals—be they phosphate lands, coal seams, or gold leads—does incalculable harm to the mining industry and retards the development of the country. We do not say that any of our contemporaries would wilfully misstate the facts in connection with any reported discovery, but it is often apparent that some of them are too easily imposed upon and assume too quickly the truth of flying reports.

The other day a Provincial Government official startled us with the following communication, "in the strictest confidence":

"In a few days the Government will announce important mineral discoveries in the Ottawa Valley which will electrify the whole country. There's millions in it! Gold is nothing to it! I am not at liberty to tell more, but you will soon hear, for I think it will be made public in about a week."

We wondered what could it be. In all probability "Natural Gas!"

Co-operation.

As we have pointed out in these columns, there is much need of greater harmony and combined effort among our miners. Lately we have been pleased to see an improvement in this regard, notably on the Lievre River, where, during the autumn, the steamers of two mines which have in the past treated each other with scant courtesy and indulged in an expensive jealousy, were combined into a joint service, one above the rapids and the other below, thus saving expense to both companies and hindering neither. The dog in the manger spirit that begrudges benefit to others should give place to the sentiment that the prosperity of one tends to the prosperity of all.

Comparative Power Drill Test.

During the past season a test to determine the amount of air consumed respectively by a Rand "Little Giant" and a Sargent rock drill was made at the Laddington mine with the following result. We understand that the Rand drill was taken out of a mine where it had been at work for about nine years, while the other drill, about which so many claims have been made, was practically a new one:

RAND DUPLEX 18" x 36" COMPRESSOR.									
DATE.	Number of Revolutions while Drilling.		INDICATED H. P.		Cu. ft. of air produced per revolution.		SIZE OF		
	Total.	Per Min.	St. Cyl.	Air Cyl.	Loss.	Free.	60-lbs.	Drilling Machines.	Drill Bits.
Test July 24th and 25th.	487	8.51	23.62	19.40	17.9%	13.42	28.641	3'8" x 6'2"	2'3/4" to 2'8"
	571	9.32	26.47	21.24	"			2'3/4" x 7"	2'3/4" to 2"
	364	7.47	20.74	17.03	"			3'8" x 6'2"	2'3/4" to 2'3/4"
Test July 30th and 31st.	504	7.31	20.20	16.66	"	13.42	28.641	2'3/4" x 7"	2'3/4" to 2'1/2"
	364	7.47	20.74	17.03	"			3'8" x 6'2"	2'3/4" to 2'3/4"
	487	8.51	23.62	19.40	17.9%			2'3/4" x 7"	2'3/4" to 2'1/2"
CONSUMPTION OF AIR.									
Clearance of Compressors = 1.2%. Receiver 13 1/2 x 4 outside of Engine-house, connected with Compressors by 44 feet of 5" pipe.	Number of Inches Drilled.	Per Minute.		Per Inch Drilled.		60-lbs.	Free.	60-lbs.	Free.
Drills boring in hard Granite Boulders.	Per Min.	114.16	22.47	209.1	41.16	125.11	24.62	197.3	98.7
Drills boring in hard Granite Boulders.	Per Min.	100.26	19.73	98.7	19.42	98.07	19.30	137.1	26.99

11. What number of bushels of coal used to produce one ton of "pig," say "grey."
12. What is the size of the furnace, that is, height and "Bosh?"
13. Is "hot" or "cold" blast used and at what pressure per square inch?
14. If used for puddling, or re-heating, please state how prepared?
15. Please state the quantity used to the ton of finished iron?

In asking these questions I presume that "Engineer" will be able to satisfy all who are interested in the iron industry of the provinces named, that we have only to "pluck" up courage enough to emulate our cousins over the border line, and by doing so we shall be able to produce iron at a profit by the use of our "sawmill wastes." Apologizing for troubling, I remain, dear sir,

Yours faithfully,
FRANCIS D. TAYLOR.



In General.

Mr. Adolph Lomer, of Messrs. Lomer, Rohr & Co., has returned from a flying trip to Europe, having been absent only about a month, going and coming by the crack Cunard steamers Etruria and Umbria. He reports a good outlook for next season's business.

Shipments.

The following are the shipments of phosphate from Montreal from 16th of October to close of navigation:

Date.	Name of Vessel	Destination.	Shippers.	Tons.
Oct. 25	s. s. Montreal	Liverpool	Wilson & Green	202
" 25	do	do	Lomer, Rohr & Co.	120
" 27	s. s. Ontario	do	Millar & Co.	165
" 30	s. s. Vancouver	do	Lomer, Rohr & Co.	100
" 31	s. s. Colina	Glasgow	Wilson & Green	200
Nov. 6	s. s. Barcelona	London	Wilson & Green	139
" 7	s. s. Baumwall	Hamburg	Lomer, Rohr & Co.	100
" 7	s. s. Concordia	Glasgow	Wilson & Green	170
" 8	s. s. Toronto	Liverpool	Millar & Co.	85
" 10	s. s. Grassbrook	Hamburg	Wilson & Green	215
" 10	s. s. Avlona	London	Millar & Co.	220
" 10	s. s. Fremont	do	Lomer, Rohr & Co.	100
" 10	do	do	Wilson & Green	150
				1,966

RECAPITULATION.

SHIPPERS.	
Wilson & Green	1,076
Lomer, Rohr & Co.	420
Millar & Co.	470

DESTINATIONS.	
Liverpool	672
London	609
Glasgow	370
Hamburg	315

Freight.

Freight prospects for the next season are favourable as the lumber and deal shipments are expected to be very large, but on the other hand the prospects are that the output of Canadian phosphate will be larger than ever before and all the available tonnage can be utilized.

Market.

English markets for phosphate may now be quoted one penny per unit higher than last spring. This is owing mainly to the rise in ocean freights which has put Charleston phosphate almost out of the range of buyers and turns attention to other phosphates less affected by this cause. Canadian phosphate, having the advantage of ballast rates of freight with deal cargoes, is in a favourable position for competition whenever tonnage becomes scarce for full cargoes from

the ports of other phosphate producing countries.

The demand in England is directed towards the lower grades of Canadian phosphate, which is partly owing to the enhanced value of the Carolina phosphate (which analyze 55 to 60 per cent.) and partly to some mysterious change in the opinions of buyers. For years past guarantees of eighty per cent and upwards have been insisted on and woe to the unlucky shipper whose phosphate turned out 79½%. Such "inferior stuff" was not wanted and a heavy reduction had to be made to secure its acceptance. Now however, there is but little demand in England for phosphate over 75 per cent. in quality and large contracts could be made for 70 per cent or even as low as 65 per cent. This will be of great advantage to the Canadian industry as the expense of keeping the quality up to eighty per cent. in the average run of mines has been greater than the increase of price gained. If foreigners wish to buy our phosphates in an impure state, or mixed with dirt instead of buying a pure article and supplying the adulteration themselves it will save expense to miners and permit a large increase of production, as there is any amount of dirt to be had at small labour cost.

Germany still requires a certain proportion of the highest grades and all that Canada can profitably produce at present of this class can be marketed in that country.

The market quotation may be stated to be 9½ for 70 per cent. with ½ d per unit rise up to 75 per cent. but no rise beyond.

Du Lievre.

Mr. S. P. Franchot has presented to the Montreal Amateur Athletic Association five tons of Pulverized Phosphate to try its virtues upon the turf of their new athletic grounds, the only place where this enterprising association "lets the grass grow under its feet."

Mr. J. Keith Reid, who has for several years been connected in business with Capt. R. C. Adams, of Montreal, and has of late aided him in the affairs of the Anglo-Canadian Phosphate Co., has removed his residence to Buckingham, and will be associated with Mr. Franchot in his phosphate, mica and spar enterprises. Mr. Reid is not only one of the most enterprising business men of the day, but is foremost in promoting athletic sports and social entertainments, so that the Lievres River may not only expect a boom in its enterprises, but the little village of Buckingham may look forward to a lively winter.

The Phosphate of Lime Company proposes to increase its capital in order to facilitate its extensive operations. A little over 6,000 tons of their output for the present year have gone to Europe, and some 500 tons have been sold to the Milling Company for shipment to the States.

Messrs. Miller & Co., Montreal, have shipped for the Canadian Company 3,925 tons. Of this quantity 2,392 tons have gone to Europe; 1,420 tons ground, to United States; 195 tons ground, and 18 tons crude, averaging from 80 to 85 per cent., have been sold to home consumers.

We are informed upon good authority that the scheme mooted by American capitalists to establish fertilizing works on a large scale in this district will go through.

It is thought that the shipments of ground phosphate from the Ottawa Valley to points in the United States for quarter ending 31st December, will exceed 300 tons.

Templeton District.

Mr. Robert Blackburn, owner of the celebrated Blackburn mines, informs us that the output of his mines for the year has been 2,500 tons. Of this 1,513 tons have been forwarded to Europe, and the balance is held over at the pits. A large amount of development work has been done on the property.

A rumour is current that a large company is being formed in New York with a capital of one million dollars, to acquire and work the old Goldering mine.

The North American Phosphate Company are still negotiating with New York people with a view to acquiring increased capital, but at the time of writing we have not heard with what success.

Perth District.

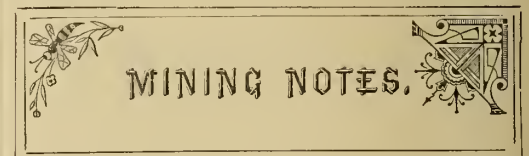
At Bobb's Lake mines, in Belford, Ont., the Anglo-Canadian Phosphate Co. will haul out a thousand tons this winter, all mined since June with a force averaging about fifteen men, which is one of the best records ever made in this industry. At the Otty Lake mines, North Burgess, the same Company continues to secure a fair output.

Kingston District.

The Foxton Phosphate mine in Sydenham, is to be offered for sale with 300 to 400 acres of land close by. They have about 300 tons of phosphate on hand, which will be sold with the mine. The shaft is down 120 feet and is provided with steam hoist and machine drills. The whole will be offered for \$50,000.

The shipments from Capt. Boyd Smith's Blessington mines for the year will figure close upon 1200 tons. Of this quantity 400 tons have gone to Hamburg and the balance to Philadelphia. A steady output and a high percentage is being maintained. A saw mill is the latest addition to the plant of these well equipped mines.

A typographical error in our last issue made the quantity exported from this district to the United States 314 tons. From figures received from the American Consulate, we are in a position to state that 814 tons, valued at \$14,652 were exported across the line.



We shall be greatly obliged to mine owners and superintendents for such authentic reports of their operations as may concern shareholders and the public.

Nova Scotia.

Messrs. I. Matheson & Co., of New Glasgow, who make a specialty of gold mining machinery, have supplied the machinery for the mines of the Minnesota Mining Company at Malaga Lake. The new stamp mill, consisting of 21 stamps, is pronounced one of the best equipped mills in the province.

The work now being done at the mines of the Eastern Development Company at Coxheath is showing large bodies of chalcopryite ore. Recent advices show that the anticipations of the existence of extensive veins of this ore are being rapidly realized, while the surface work of the western extension of the lode, known as the "Argyle" mine, which was lately purchased, is thought to demonstrate the con-

tinuance of the same veins that are now being worked on the original area.

The returns for November for the Dufferin mines, Darr's Hill, are 202 ounces of gold from 750 tons of quartz.

At Lake Catcha, the Oxford mill yielded last month 133 $\frac{3}{4}$ ounces of gold from 117 tons of quartz, while 21 $\frac{1}{2}$ ounces from 20 tons of quartz was got from the Cambridge mill.

At South Uniacke the Withrow property yielded 112 ounces from 30 tons crushed.

The Miners' mill, Sherbrooke, reports its product of gold for November to have been 47 ozs. from 250 tons quartz crushed. The Goldenville mill yielded 11 $\frac{1}{4}$ ozs. from 49 tons crushed, and the London mill 14 $\frac{1}{4}$ ozs. from 130 $\frac{1}{2}$ tons. The latter is evidently a new property or an old property, but lately reopened.

Circulars have been sent out by the inspector of mines to the members of the Examining Board and others, informing them that the Government have under consideration the following plan of instruction for those desirous of qualifying themselves for positions in coal mines, and asking suggestions:

"The appointment of, say seven men in the most convenient localities, each of whom would be paid a small retainer, provided that he prepared not less than two candidates; also, a fee for each candidate prepared by him, and passed by the Examining Board as an Overman; and a larger fee for each candidate prepared by him, and passed as an Underground Manager. In addition he would be allowed to charge each candidate instructed by him a small fee, not exceeding \$2. The appointment of teachers to be annual."

The Neptune Mining Co., of Gold River, Ches'er Basin, have just ordered a ten stamp mill, with engine and boiler complete, from I. Matheson & Co., New Glasgow, N. S.

There is considerable excitement in Gay's River over the prospect of the development of the gold mines there on an extensive scale. Mr. William Frost, of Brooklyn, New York, a mining expert of experience, visited the grounds last week in the interest of a number of American and New Brunswick capitalists, and if he reports favorably operations will be commenced on a large scale.

The promising gold mining property situated at Gold River, owned by Messrs. F. B. Wade and Wilson & Wade, was sold on Friday to W. J. Nelson for \$30,000, and by him immediately conveyed to a Minneapolis syndicate at an advanced price. The recent mill, taken from one of the many leads upon the property, gave \$65 to the ton, the lead being twenty inches in width. The purchasers have secured the services of C. E. Willis as manager, and will commence the work of developing and the erection of a ten stamp crusher at once. Experts consider this property one of the best in Nova Scotia. — *Gold Hunter*.

The *Critic* says: It is rumored that the copper mines at Dorchester are again to be operated. The Colonial Copper Mining Company and the Westmorland Mining Company, known as the "Couch" company, are to be amalgamated and the mines worked by one company. Two Amer-

ican gentlemen are expected shortly to complete the necessary arrangements. The increased price of copper is said to have caused the movement.

New Brunswick.

The mines of the Brunswick Antimony company, at Frederickton, have been closed, and for the present, operations have been suspended at the company's works at Glenwood, Mass.

Letters patent have been granted at Frederickton incorporating Daniel W. M'Vicar, of Moose Brook, miner; James H. Stevens, farmer; Alexander Robertson, farmer; Robert Bacon, farmer, of Ardoise; John T. Dimock, farmer; Judson J. Dimock, farmer, of Newport; Frederick Knowles, of Avondale, merchant; Everitt A. O'Brien, of Noel, shipowner; Carwen C. Crow, of Lower Selmah, prospector; Henry T. Harding, of Truro, solicitor; all in the province of Nova Scotia, and John H. Harding, Saint John, for the purpose of developing gold and silver mines and other mining properties, etc., by the name of The Ardoise Gold Company (limited), with a total capital of \$50,000, to be divided into 10,000 shares of \$5 each.

Quebec.

Capt. Adams, of Montreal, confirms his report of the discovery of gold on property of the Anglo-Canadian Phosphate Co., in Wakefield. Though giving a small average to the ton, the immense size of the vein of quartz may make it possible to work it immediately. The vein measures 69 feet in width and extends several hundred feet across a hill and descends into the valley on each side. The late Mr. Venor in several of his reports referred to the probability of gold being found in Wakefield in paying quantities, and it may be worth while for owners of lands in that region to make tests of the quartz.

The Megantic Mining Co. (Messrs Fenwick & Selater) have taken out 100 tons of asbestos since the 15th of August with a force of ten men.

The Wertheim property is being opened up and gives good promise of being an excellent mine. Capt. Learmouth has 14 men at work, and is taking out on an average one ton of asbestos per day, worth \$50 per ton.

Macdonald Bros., Sherbrooke, have made a discovery of asbestos which promises well, on lot 8, 12th range of Coleraine. The fibre is of good length and quality.

Col. DREW GAY has arrived and will superintend operations at the Excelsior Copper Company's mines. The daily reports from the mines are said to be most encouraging. The veins are reported to improve with depth, and richer ore is being taken out.

The shares of the Bell Asbestos Company (Limited), which were issued only a few months ago at £5, are now quoted in London at £19, and are still going up. The directors of this flourishing concern are: John Bell, sole member of the firm of Messrs. John Bell & Son, chairman; Francis Corbett Bell, of the same firm, managing director; Herbert A. Bell, Messrs. Bell & Co., Cardiff; Arthur J. Burnett, Kingston on Thames; James Hartley, D.L. (Messrs. Paton & Charles, Tunnel Soap Works), London; Thomas B. Lightfoot, C.E.,

The Thetford mines continue to turn out satisfactory outputs.

A rich discovery of gold has been made at St. Francis, Beauce, near St. Joseph.

Ontario:

Mr. Robert R. Hedley, analyst, lately of Sudbury and more recently of Sault Ste. Marie, will leave next month to take charge of the metallurgical department of copper mines in Venezuela, South America.

We hear that negotiations for the sale of the Frontenac mica mine to English capitalists are in progress.

Sudbury District.

The output of the mines of the Canadian Copper Company for October was close upon 4,500 tons. At Copper Cliff the smelting works are nearing completion. The trestle-work over the roast heaps is fully two-thirds of a mile in length and is now ready for track-laying. Twelve hundred tons of ore are now in process of roasting. Dr. Peters, an able copper metallurgist, is general manager. Capt. Frank Andrews is the general superintendent, and his extensive practice serves him well in mining and handling the deposits of this district. Mr. John Grigg, late master mechanic of the Tamarack mine, fills the same responsible position here. Mr. Frank L. Sperry, late of Yale College, is the chemist and assayer. Each department appears systematic and orderly.

The Vermilion mine closed down on the 1st ult. This is said to be "a weak invention of the enemy," or, in other words, a game of "freeze out," it being well understood that the discoverer cannot meet the necessary assessments levied upon him. This is an ore deposit comprising a great variety of minerals and two analyses resulted in five ounces of platinum to the ton. Nuggets of gold have also been extracted from this interesting deposit, while the amount of nickel in the ore from special tests made in Toronto for your correspondent resulted in from 17 to 30 per cent of nickel. But, notwithstanding all this rare combination of the "economic and ornamental," work is closed down *pro tem.*, and the poor prospector is left to reflect on the possibility of his having too much of a good thing. — *Engineering and Mining Journal*.

A late despatch reports that the Canadian Copper Company has purchased the interests of the original shareholders of the Vermilion company.

Port Arthur District.

The Badger mine still continues to produce silver ore of the same extraordinary richness as heretofore. So far it has proved a miniature Silver Islet, with this advantage, however, that the cost of operating the former is only a very small per cent of the latter. Every little while a carload is shipped to the States to the smelters.

The Beaver mine, being a close corporation, keeps steadily on full force without making any ado about it. The manager of this mine, we learn, is at the Lake of the Woods gold fields, seeking more fields for investment. The Elgin mine, under his able management, is now a pronounced success, and we expect before long to be able to record some of the solid results after the necessary preliminary work is all in good shape for increased output.

Silver Mountain mine, since last reports, has continually improved in drifting west from No. 3 shaft at the 360 foot level. The management are highly pleased, and an expert from England has just arrived on the ground to make a report on present appearances and future developments.

The "West End" of Silver Mountain is in high feather—every opening shows silver, and the finding of silver at 360 feet deep, just east of the main on the same vein, establishes the value of this magnificent property. The managers have been visiting Denver, Col., to arrange for the smelting of all their shipping ore.

The Silver Fox mine, owned and operated by the "West End" Co., is doing the best it can in that remote region—almost inaccessible for the want of railway facilities. There is nothing new to report since last issue.

The Wolverine mine, about a mile to the east of the Silver Fox, has been purchased by a London syndicate, who have already dispatched a working force to the ground, and will employ one hundred men as soon as they can be worked to advantage.

The iron lands at the Kaministiquia station, west of Port Arthur, are being thoroughly tested by a party from Pittsburgh, who has invested heavily. Iron lands elsewhere are likewise receiving attention from capitalists who are buying up likely properties wherever available.

Several minor sales of silver locations are likewise reported, and a new life seems to have taken hold of this district, now that the Privy Council of England have finally settled the fact that the Province of Ontario can now give indisputable title to lands between Port Arthur and Rat Portage.

The stone quarries and lead mines east of Port Arthur are keeping steadily at work, with nothing special to report.

Port Arthur should have a mining school and a smelter to keep apace with the advancement of the district.

Rat Portage District.

The Privy Council award settling the titles troubles has been received with joy. A by-law granting a \$15,000 bonus to smelting works will now be passed and the works started at once. Already Americans are on their way to Toronto to get their patents, and preparations are being quietly made, plans discussed, for a special boat to bring ores in from all around the Lake of the Woods to the smelter. The boat is to be nearly flat on the bottom and have a novel plan of loading and unloading ore.

British Columbia.

Nanaimo *Free Press*: The foreign coal shipments from the port of Nanaimo, representing the Vancouver Coal Company, the Wellington collieries, and the East Wellington colliery, for the month of November amounted to 46,887 tons, being the largest shipment from this port in the history of Nanaimo. The shipments of last July amounting to 40,158 tons was the largest reached before November. November month therefore beats all previous records by 6,729 tons of coal.

There is an apparent mistake in the London dispatch concerning the bonding of Rosenfeld's Nanaimo coal lands to the Vancouver company. Mr. Rosenfeld has no land in Vancouver island.

The dispatch, doubtless, should have read that the Vancouver company have bonded their property to Mr. Rosenfeld for three years at a certain figure.

A late arrival from Granite Creek states that placer mining is finished for the season, and there is nothing being done at present but a little drifting, preparatory to next year's work. Some new quartz finds have been made in different parts of the district, but their richness has not yet been learned. Work will be resumed in March, when it is expected a large number of new claims will be opened.

At the Hot Springs camp, 30 miles north of Nelson, G. B. Wright has 20 men at work on his No. 1 mine. An assay from an average sample of the ore taken from the full width of the face of the ledge gave \$500 to the ton. Mr. Wright will run a 300-foot tunnel this winter. He is also building a 150-ton steamer to ply between his claims and Bonner's Ferry. Mr. Davenport has made a 30-ton shipment from his Little Donald claim, and is now working 10 men. W. Wheeler has 10 or twelve men at work on his great carbonate ledge. The Hendryx Company are working 20 men; and there are a number of other claims in both the new and old camps working from two to four men each.—*Truth*.

For week ending 8th inst., the Monarch mine at Field shipped 5 cars of ore to the smelter at Vancouver, making 10 cars in the last two weeks. The shipments will approximate 200 tons. The ore carries about \$26 a ton in silver and a large percentage of lead. Pig lead was selling in New York city on November 29th at $3\frac{1}{4}$ to $3\frac{1}{2}$ cents a pound; therefore, it is safe to estimate the metal value of the ore at \$50 a ton, which would make the two weeks' shipment, worth fully \$10,000. British Columbia at last, has become a permanent ore shipper, and in the next twelve months its total output will outrank that of many of the older bullion-producing states and territories south of the boundary line.

The owners of the locations on Toby creek are negotiating with parties with a view of placing a bond on the property. There are five claims in the group, and they ask \$15,000 each for four of the claims. These figures are considered too high by the parties who wish to place the properties.

As an indication of the richness of the ore found in the district tributary to Donald, the following assays, made by Bredemeyer of Vancouver are given. The ore was a picked sample of grey copper: Sample No. 1 carried \$169.41 in silver and \$48.23 in gold to the ton, and 46 per cent copper. Sample No. 2 gave a return of \$146.99 in silver and \$48.25 in gold to the ton and 41 per cent of copper. The owner of the claim, of course, holds it at a high figure. Well, \$300 rock is not to be sneezed at.—*Truth*.

An Electric Omnibus.—An electric omnibus has been successfully tested on some of the most crowded thoroughfares in London. This is said to be the only electric omnibus in the world capable of steering to right and left, and of running on a common road without rails at a speed greater than that of horses.

The Petroleum Fields of Ontario.

ROBERT BELL, B. A., S.C., M. D., L.L.D.

(Continued from November Issue.)

The petroleum of the Enniskillen region was early conceived by Logan and Hunt to occur on the course of the great Cincinnati anticlinal, which was, however, thought to be connected with the anticlinal of the head of Lake Ontario; and, following up this view, maps were published, and much was written by others, tracing the supposed position of the anticlinal, and shewing where oil might be looked for along its course. In the "Geology of Canada" (p. 379) Sir William Logan says: "The general course of the main anticlinal can be readily traced by means of the distribution of the formations. It would appear that the crown of the arch runs in a gentle curve from the western extremity of Lake Ontario, by Woodstock in the neighborhood of which the base of the Corniferous folds over it. Proceeding thence by the Thames in the general course of the Great Western Railway, it would reach the town of Chatham, and then pass to Pigeon Bay, on Lake Erie. The Springs of Enniskillen would appear to lie north of this axis, and they may probably be on a subordinate one, parallel with it; which may be connected with the undulation that has been already mentioned as affecting the outcrop of the Guelph formation at Rockwood." It is stated ("Geology," p. 363) that "a belt of higher Devonian rocks crosses the country from Lake Huron to Lake Erie, and divides the region into two areas. These newer strata occupy a saddle-shaped depression on the great Cincinnati anticlinal, which runs nearly east and west through the peninsula; while the course of this depression or synclinal is nearly north and south from Plympton on Lake Huron to Orford on Lake Erie. There seems to be no doubt that the occurrence of petroleum in Enniskillen is connected with the Cincinnati anticlinal, but the writer, after having done a considerable amount of geological work in Western Canada at various times since 1859, and having carefully studied this question, has come to the conclusion that this anticlinal, coming up from Ohio, does not run eastward, as Logan supposed, into Lake Ontario, but that it maintains its northward course, and runs into the Southern extremity of Lake Huron. This geological axis is not marked by a conspicuously visible fold in the strata, as in narrower and sharper anticlinals, but it nevertheless constitutes a remarkable feature in the geology of North America. Southward of Lake Erie, in the form of a long, wide swell, it is plainly traceable by the geological distribution of the formations through Ohio and Kentucky, and again, in Tennessee and even in Northern Alabama. It separates the Pennsylvania from the Illinois and Michigan coal fields. Northward of Lake Erie, an impartial study of what is actually known of the geographical structure, as well as of the distribution of the formations, indicates that its axis, after crossing the lake, continues on, as we should naturally expect it would, in the same general north-north-eastward bearing through the counties of Essex, Bothwell and Lambton, from about Little's Point on Lake Erie, to about Kettle Point on Lake Huron, from which it probably continues in the same course under the latter lake, and parallel to its eastern shore, to a point opposite Southampton, where, turning a little more to the north-east, it would cross the Indian Peninsula parallel to another anticlinal, that seems to run through Saginaw Bay and the

gap between the extremity of this peninsula and Grand Manitoulin Island.

Following the line of axis above indicated, northward from Kentucky, where the Trenton limestone forms the surface, the different geological formations become successively more and more deeply buried as they fold over this line, one after another, each forming a long curve or "nose" to the north. Judging by the records of the borings, the northern point of the Niagara formation, where it curves round this axis, may touch the north shore of Lake Erie, while the Onondaga formation probably occupies a great part of the county of Essex, and is in turn followed by the Corniferous, Hamilton, and the Portage and Chemung, in Lambton. Northward of Plympton and Bosanquet the axis of the anticlinal gradually rises, and in following it on in the same direction the order of the reappearance of the formations in succession along it becomes, of course, the reverse of what it had been to the south of that region, and we get the Corniferous in the county of Huron, followed by the Onondaga, Guelph and Niagara in that of Bruce. The south west course of the Onondaga formation, on the east side of Lake Huron, first pointed out by the writer in 1861, proves the existence of an anticlinal to the west under the lake. Owing to the existence of the synclinal or belt of higher Devonian rocks, which Sir William describes as crossing the country in a nearly north and south course from Lake Huron to Lake Erie, shewing that the strike is really in that direction it would necessarily follow, from structural considerations, that there must be an accompanying anticlinal to the west of it, and we have just seen that this brings to the surface the older Devonian rocks under the drift in the Enniskillen region, and that it is, in fact, the Cincinnati anticlinal. Prof. Edward Orton, State Geologist of Ohio, has published a valuable report on the recent discoveries of petroleum and inflammable gas in the north-western part of that State. He thinks the Trenton limestone received its low arched form along the Cincinnati anticlinal in that region before the next formation was deposited upon it, which would indicate extensive movement at a very early geological time. He says: "There is a smaller measure for these shales by 200 feet in the central region than there is immediately to the eastward. In other words, there is an arch in the underlying Trenton, revealed by the drillers, of which no hint whatever could be obtained by the surface exposures" (p. 29). A further upward movement of the anticlinal may have taken place in Ontario after the formation of the Corniferous limestone, and before the deposition of the Hamilton shales upon it, for in certain parts we find the Marcellus shale eastward and westward of the axis, but not directly upon it. The Onondaga formation is shewn by borings to carry important beds of salt near its base, and to be greatly augmented in volume in Western Ontario along a belt to the east of the anticlinal, and apparently parallel to its axis, all the way from the county of Huron to Essex; and it is possible that the shallow sea or bay in which these deposits took place had the same general direction, and that it was held in position by the arched form of the older strata, the successive beds of salt being formed as slight changes in the sea level took place from time to time. Beds of salt of considerable thickness are found again westward of the axis, along St. Clair River.

The cause which produced the Cincinnati anticlinal must have begun at a very early geological period, and appears to have been of continental extent. It is worthy of notice in this con-

nection that, if its general course were prolonged northward in the vast regions of the more ancient rocks, it would pass through the central and clearly volcanic portion of the great Huronian trough of the Abitibi region, and further on would follow the deepest and longest part of the immense physical and geological depression of Hudson Bay and Fox Channel. The line would next pass through an elongated Silurian area in the midst of the Archæan, and thence by Smith Strait, Kennedy and Robertson channels, or the direct chain of waters followed by explorers to the most northern points which have ever been reached by man. The long chain of volcanic islands in the eastern part of Hudson Bay lies directly along this line, and the existence of immense north and south dykes of trap for a great distance south of James Bay, was pointed out in my report for 1875. Great north and south masses of trap occur on this line around Lake Temagami; and at the mouth of French River which is also on its course. I am informed by Commander Boulton, R. N., that there is a large abnormal deviation of the compass. The line above indicated measures thousands of miles in length, and, as will be observed, it is almost straight. The fact that the axis of the Cincinnati anticlinal lies in direct continuation of this long chain of geological and geographical features, is probably more than a chance coincidence, as the latter may well be supposed to have constituted a line of weakness which would be affected by any east and west movement or force in the crust of the earth, and slight, but persistent, elevations of the Palæozoic strata south of the Archæan area may have easily taken place along its course, and these disturbances may have occurred at different geological periods, as some of the above mentioned facts would seem to indicate. Leaving the subject of the cause and general course of the Cincinnati anticlinal, some practical results may be obtained by a study of the peculiarities or details of this great arch. The trend of its crown varies locally, of course, but the geological distribution of the formations at the surface show that this axis, coming northward from Kentucky and passing under the town of Findlay, would strike the south shore of Lake Erie about midway between Toledo and Port Clinton; but in this vicinity the general wave is divided by a small synclinal into two subordinate anticlinals. Professor Orton has shown, by the result of borings, that the form of the Trenton area in north-western Ohio, as indicated by a horizontal plane at 500 feet below the sea level, would prove that the axis at that depth points directly towards Toledo. Notwithstanding the difference in the courses of the deeply seated and surface folds, the main axis of the anticlinal will intersect the north shore of Lake Erie in the vicinity of Little's Point, in the county of Essex; then running about north north-east through Essex, Bothwell and Lambton, it will reach the southern shore of Lake Huron near Kettle Point. Its general bearing from Lake Erie to Lake Huron is about N. 30° E., but it appears to curve gently to the south-east of a straight line and to pass under Petrolia.

South of the edge of the Archæan nucleus, which forms the north shore of Lake Huron and Georgian Bay, the axis of the numerous anticlinals in the Palæozoic strata run south and south-west and their average course corresponds with that of the Cincinnati anticlinal but as we recede from the outcrop of the ancient rocks, and the newer strata deepen over them, the inequalities in the old foundation become covered up and more and more obliterated, and smaller undulations running in other directions manifest

themselves. The Cincinnati anticlinal in south-western Ontario, as elsewhere, is a gentle swell of great breadth, but within its general area, and especially near the summit, are minor anticlinals, sometimes of a sharper form, running both parallel with and transverse to its general course. One of these secondary anticlinals, having the former course, is shewn to exist in Euphemia, both by the dip and distribution of the rocks. At Smith's Mills, in this township, it interrupts the overlying Portage group, and brings to the surface the limestones of the Hamilton formation, with a north-westward dip of 40 or 45 feet to the mile. (Report of Mr. Alex. Murray, for 1850, p. 29). Between this undulation and the main axis in Enniskillen, about 150 feet of the black Marcellus shales have lately been found by borings in a trough between the two anticlinals, in the north-eastern part of Dawn. In the Ontario oil field, the drillers consider it a bad sign to strike these black shales, as experience has taught them that, in such cases, no oil is to be found in the underlying Corniferous limestone, the reason apparently being that these shales occupy only the synclinals in the oil-bearing formation.

The transverse undulations appear to follow two principal courses, one about east and west, and the other north-westward. The anticlinal of the head of Lake Ontario, and the sharper one of Rockwood and others further north, are examples of the former. In northern Ohio the formations dip northward at very low angles along the line of the Cincinnati anticlinals, but a transverse uplift seems to run east and west through the natural gas field of Lima, for Prof. Orton says (p. 28) that "the surface of the Trenton limestone is approximately at the same level at Van Wert, Lima, and Upper Sandusky, or along an east and west line 60 to 70 miles in length." The great spread of the Corniferous formation in north-eastern Indiana is probably due, in part, to an elevation of the rocks running in this direction from the vicinity of Lima to the south end of Lake Michigan. About latitude 42° the strata strike east and west all the way from the Hudson River to the Mississippi, except where this parallel intersects the Cincinnati anticlinal, and it is somewhat remarkable that west of the Appalachian range the southern boundaries of all the Archæan areas, just above this latitude, lie in an east and west line across the entire continent. These facts are mentioned as having a possible bearing on the formation of east and west anticlinals in the regions under discussion. The course of the oil producing belt in Enniskillen and Euphemia is probably evidence of the existence of a north-westward undulation in these townships, and the fact that the Bothwell oil-field lies south-east of this region, may be an additional fact pointing in the same direction. An undulation in the Corniferous limestone, running nearly north-west, is to be seen on the 13th lot of the 1st range of Rainham, on the north side of Lake Erie ("Geology of Canada," p. 379.) In the vicinity of Milwaukee there are distinct evidences of north-westerly folds in the strata. It may be worthy of note in this connection that if a straight line be drawn at right angles to the centre of the great north-westward curve in the folded strata of the Alleghany Mountains in Pennsylvania, it would have a west-north-west course, and would pass in the vicinity of the Enniskillen oil-field.

From what has been said in regard to the anticlinal theory and the accumulation of petroleum, it follows that the most probable sites for searching for this fluid in the regions just described, are at points where the great anti-

clinal is intersected by one of the transverse folds whose existence has been indicated. Owing to the depth of the drift and the infrequency of exposure of the underlying rocks, we must depend principally on the "logs" of wells drilled, in various parts of the possible oil region for the data to guide us; hence the importance of preserving these records, even if the wells have failed to answer the purpose for which they were originally sunk. These records are also of much value in determining the actual thickness of the Silurian and Devonian formations in western Ontario, where their increase or decrease goes on at pretty regular rates, so that we are able to predict with tolerable accuracy the depth at which any one of them may be found by boring at a given locality.

Dr. T. Sterry Hunt, in his valuable Report for 1866, has put on record the "logs" of a large number of wells which had been bored up to that time in western Ontario, and which would have been otherwise lost. It is to be regretted that the registers of the still greater number of wells which have been sunk since that time, have not been systematically preserved. In regard to general deductions, from information obtained by well-boring, the extensive experience of our neighbors in the analogous regions of Ohio and Michigan, is of great value to us.

The petroleum of the Enniskillen region has hitherto been supposed to have originated in the Corniferous formation, but from circumstances which have lately come to light, it seems possible that it may have its origin, wholly or in part in the Trenton limestone. Without necessarily adopting this view, the writer may mention the following, among other circumstances which appear to favour it:—

1. The Trenton limestone along the Cincinnati anticlinal has proved to be eminently an oil-producing formation in north-western Ohio, as well as near Barksville and elsewhere in Cumberland County in Kentucky, where great flowing wells of petroleum were found in boring for brine in 1829. Wells sunk in the same region in later years have yielded large quantities of oil. (Dr. Hunt's Report for 1866, p. 253). This formation is not likely to have lost its oil-producing character within a short distance on passing into Canada. On the contrary, we know that much further to the north it yields petroleum on Manitoulin Island, where the writer has seen wells drilled into it near Weginiakong and at Pine Lake. Petroleum, or pitch resulting from it, are found in this formation in other parts of the Dominion. At one of these localities near Chicoutimi on the Saguenay, where petroleum exudes from the Trenton limestone, gallons of it have been collected, by breaking open the cavities in the rock. Again, to the west, the Lower Silurian limestones in the vicinity of Chicago, are said to hold petroleum.

2. The Trenton formation is of a more generally bituminous character than the Corniferous, and it is also much thicker. In various parts of the provinces of Quebec and Ontario it ranges from 600 to 750 feet in thickness, including the Black River and Birds-eye, but not the Utica; and at Findlay in Ohio, the drill has passed through 550 feet of it. (Prof. Orton's Report, p. 18).

3. In the States of New York and Ohio, the Corniferous is not a petroleum-bearing formation. Although oil has been observed in its cavities in some places in the south western part of Ontario, there is nothing to show that it was originally formed in these rocks. Its thickness in western New York is only ninety

feet, but in the townships of Woodhouse and Townsend in Ontario, seventy miles west of Niagara River, it has attained 160 feet. In Ohio, its thickness is from 75 to 175 feet, and at Mackinaw, in the northern part of Michigan, it is 275 feet. In south-western Ontario, well-borings have given the following thickness for limestones believed to represent the Corniferous: Port Lambton, 320 feet; Petrolia, 248 and 378; one mile south-west of Belle River, 209; Leamington, 310; but it is difficult in all cases to draw a line between the limestones of this formation and those of the underlying Lower Helderberg or upper part of the Onondaga (salt) formation. For example, the following thickness of limestones were obtained in wells starting on the Corniferous: Test Well at Petrolia, 623 feet; artesian well at London, 1,000 feet; at Comber, 520 feet; at St. Mary's, 500 feet; at Tilsonburg, 854 feet; at Clinton, 975 feet. In boring salt wells at Goderich, 775 feet, and at Kincardine, 508 feet of limestone of the Onondaga formation alone were passed through.

4. The petroleum of Enniskillen has the same pungent or sulphurous character as that derived from the Trenton limestone of Ohio and Manitoulin Island, and its chemical constitution appears to be identical, as it requires the same peculiarities in the process of refining to deodorise it; whereas petroleum known to originate in Devonian rocks, are of a different character in various respects. Dr. Sterry Hunt, from whose valuable report for 1866, some of the above figures are taken, hinted (on p. 254) at the possible Trenton origin of the petroleum of Oil Springs, although elsewhere he always maintained that its probable source was in the Corniferous limestone. If all the formations are present under Enniskillen, with their probable volumes, and if the writer's estimate of their thickness be correct, the top of the Trenton limestone will lie some 2,600 feet, or half-a-mile, below that of the Corniferous formation. Notwithstanding this considerable depth of the intervening strata, it may have been quite possible for petroleum to have come up from the lower formation and stored itself in the cavities and fissures of the upper one; and indeed it may even now be steadily rising through natural Channels from great accumulation remaining in the deeper source, and this may, perhaps, account for the large, long continued and nearly uniform yield which this small territory has kept up and is still maintaining. But if the Cincinnati anticlinal had been formed in the Trenton in this region before the deposition of the overlying strata, as appears to have been the case under Findlay in Ohio, this formation may lie considerably nearer the surface than has been supposed. A careful comparison of the gas and the bitter saline water which accompany the Enniskillen petroleum with those from the Trenton limestone in Ohio and different parts of Canada, might be of service in helping to determine the question of the original source of the petroleum. In recent years, no wells have been drilled in the Enniskillen oil-field beyond the depth known to give the best return in petroleum, but, in 1878, Mr. J. L. Englehart, with commendable enterprise, sunk a well to a depth of 1,505 feet, on the 12th lot of the 11th concession, about seven-eighths of a mile north of the centre of the town of Petrolia. The last 400 feet were said to consist of gypsum and rock-salt and the 500 feet just above these were stated to be light colored hard limestone with sandy beds.

The strata in this field are so nearly horizontal, and so constant in thickness, that, over considerable areas, the drillers count with cer-

tainty on striking the same beds at nearly the same depths. The following is the average descending section in the thousands of wells which have been drilled around Petrolia:—

	Feet.
Stiff blue clay, with stones and some boulders.....	100
Upper limestone, with a little black shale occasionally at the top.....	50
Bluish gray and drab shale "Soap stone", with a few hard layers.....	120
Middle limestone.....	15
"Soapstone", with two or three hard beds.....	40
Lower limestone (Corniferous) in which oil is found at 45 ft. "upper show" and also "lower show" at.....	135
Total from the Surface.....	460

The Corniferous limestone has a thickness in this vicinity of about 300 feet, but it has been found by experience that it is seldom worth penetrating more than 135 feet into it. In Sarnia township, the drift clay is 145 feet deep, but the oil is met with at 385 feet from the surface, or only 240 feet in the rock, instead of 360, as at Petrolia, shewing that more of the solid strata had been denuded away in Sarnia than at Petrolia before the clay was deposited.

The wells are bored by tubing the drifts deposits, so as to shut off the surface water, when the work of boring in the solid rock is begun—the motive power being a small engine. The drilling apparatus is suspended by wooden rods, which constitute the peculiar, and, it is claimed, a superior feature, of the Canadian method, which is now in universal use in this country. The rods, which are of hardwood, measure 18 feet in length, and two of them fastened together, end to end, make what is called a "length". The lengths are joined to each other by a tapering screw at the one end, fitting into a corresponding treaded socket at the end of the next. They last throughout two or three years of constant use, although unscrewed and screwed together again very frequently. The rods are withdrawn from or lowered into the hole by means of a derrick, and latterly by a tall tripod, erected over the well. Boring for oil has developed into an established trade, and about 100 skilled men are employed in it. The process has become so systematised and cheapened that it costs only about \$400, and requires but one week, working day and night, to sink an average well at Petrolia. Mr. W. K. Gibson, an oil merchant, of that town, informed me that 2,392 wells had been in operation at Oil Springs, Petrolia, and in Sarnia Township, in 1885, but that 193 of these had been shut down during the year, leaving 2,199 in operation on December 31st. The writer is indebted to Mr. James Kerr, the obliging secretary of the Petrolia Oil Exchange, for the most of the following statistics. He states the number of wells which had been pumped in 1886 at nearly 2,600, and the number of new wells sunk during the year at about 200. Some 500 of the above wells are situated around Oil Springs. For the last few years, the proportion of successful wells to the "dry holes," or those not worth pumping, has been 80 per cent. In the early days of the industry a separate engine was used to pump each well, but now, by an ingenious contrivance of rods and cranks, called "jerkers," 20 to 40, and even 50 wells, are pumped by one engine, and this of much smaller power than would be supposed necessary. In one case, Mr. Englehart worked no fewer than 70 wells with a single engine by this means. The rods, which are small, are made of hard wood, spliced together with iron, and, in order to diminish friction, they are hung from a horizontal wooden rail about four feet from the ground, by means of very light iron suspenders, which swing back-

ward and forward with each stroke of the engine. The direction of the force is changed, whenever required, by means of horizontal cranks. With such economy in the cost of pumping, it has become possible to work profitably wells which yield only small quantities of oil. Indeed, in 1886, the average production per well per day in the Petrolia region was only twenty three imperial gallons, or not much more than half-a-barrel. The ten largest wells in the district furnished an average of twenty barrels each, of thirty five imperial gallons, per day. In 1886 the total quantity of crude oil produced in the entire region was 576,000 barrels of the above capacity; and of this amount, Oil Springs contributed 180,000 barrels. At

the latter place the yield diminished rapidly from 1860, the time of the discovery of the spouting wells, till 1865, when operations ceased, and nothing was done for sixteen years. But, in 1881, some of the old wells were revived by means of torpedoes; new wells were drilled in 1882, and operations were again active in 1883, when some 45,000 barrels were produced; in 1884, 130,000, in 1885, 145,000, and in 1886, 180,000 barrels, or a total of 500,000 barrels since the revival.

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3rd.—Nine acres of lot No. 28, in the 5th range, with water privileges thereto appertaining, being site of mill dam, etc., etc.

The property formerly belonged to the Montreal Plumbago Mining Company, and was worked successfully for several years, until the company's mill was destroyed by fire, but the mill dam remains almost uninjured, and there are on the property several houses, sheds, etc., built for various purposes when mining operations were carried out.

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upon the property are regarded as amongst the richest and most extensive in the Dominion. As to the quality of the Plumbago, it has been extensively used in the manufacture of crucibles, lubricating leads, stove polish, etc., etc., and given unbounded satisfaction. This is established by the experience of consumers, and by a certificate from the celebrated Battersca Crucible Works, London, England, a copy of which is open for inspection.

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has also been discovered in quantities.

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THE CANADIAN MINING REVIEW
OTTAWA.



Department of Inland Revenue.

An Act Respecting Agricultural Fertilizers.

The public is hereby notified that the provisions of the Act respecting AGRICULTURAL FERTILIZERS came into force on the 1st of January, 1886 and that all Fertilizers sold thereafter require to be sold subject to the conditions and restrictions therein contained—the main features of which are as follows:

The expression "fertilizer" means and includes all fertilizers which are sold at more than TEN DOLLARS per ton, and which contains ammonia, or its equivalent of nitrogen, or phosphoric acid.

Every manufacturer or importer of fertilizers for sale, shall, in the course of the month of January in each year, and before offering the same fertilizer for sale, transmit to the Minister of Inland Revenue, carriage paid, a sealed glass jar, containing at least two pounds of the fertilizer manufactured or imported by him, with the certificate of analysis of the same, together with an affidavit setting forth that each jar contains a fair average sample of the fertilizer manufactured or imported by him; and such sample shall be preserved by the Minister of Inland Revenue for the purpose of comparison with any sample of fertilizer which is obtained in the course of the twelve months then next ensuing from such manufacturer or importer, or collected under the provisions of the Adulteration Act, or is transmitted to the chief analyst for analysis.

If the fertilizer is put up in packages, every such package intended for sale or distribution within Canada shall have the manufacturer's certificate of analysis placed upon or securely attached to each package by the manufacturer; if the fertilizer is in bags, it shall be distinctly

stamped or printed upon each bag; if it is in barrels, it shall be either branded, stamped or printed upon the head of each barrel or distinctly printed upon good paper and securely pasted upon the head of each barrel, or upon a tag securely attached to the head of each barrel; if it is in bulk, the manufacturer's certificate shall be produced and a copy given to each purchaser.

No fertilizer shall be sold or offered or exposed for sale unless a certificate of analysis and sample of the same shall have been transmitted to the Minister of Inland Revenue and the provisions of the foregoing sub-section have been complied with.

Every person who sells or offers or exposes for sale any fertilizer, in respect of which the provisions of this Act have not been complied with—or who permits a certificate of analysis to be attached to any package, bag or barrel of such fertilizer, or to be produced to the inspectors to accompany the bill of inspection of such inspector, stating that the fertilizer contains a larger percentage of the constituents mentioned in sub-section No. 11 of the Act than is contained therein—or who sells, offers or exposes for sale any fertilizer purporting to have been inspected, and which does not contain the percentage of constituents mentioned in the next preceding section—or who sells or offers or exposes for sale any fertilizer which does not contain the percentage of constituents mentioned in the manufacturer's certificate accompanying the same, shall be liable in each case to a penalty not exceeding fifty dollars for the first offence, and for each subsequent offence to a penalty not exceeding one hundred dollars. Provided always that deficiency of one per centum of the ammonia, or its equivalent of nitrogen, or of the phosphoric acid, claimed to be contained, shall not be considered as evidence of fraudulent intent.

The Act passed in the forty-seventh year of Her Majesty's reign, chaptered thirty-seven and entitled, "An Act to prevent fraud in the manufacture and sale

of agricultural fertilizers," is by this Act repealed, except in regard to any offence committed against it or any prosecution or other act commenced and not concluded or completed, and any payment of money due in respect of any provision thereof.

A copy of the Act may be obtained upon application to the Department of Inland Revenue, as well as a copy of a Bulletin which it is proposed to issue in April, 1888, concerning the fertilizers

E. MIALL,
15th Dec, 1887. Commissioner.



ONTARIO

Mining Regulations.

The following summary of the principal provisions of the General Mining Act of the Province of Ontario is published for the information of those interested in mining matters in the Algoma District, and that part of the Nipissing District north of the Mattawan River, Lake Nipissing and French River.

Any person or persons may explore for mines or minerals on any Crown Lands surveyed or unsurveyed, not marked or staked out or occupied.

The price of all lands sold as mining locations or as lots in surveyed townships is two dollars per acre cash, the pine timber being reserved to the Crown. Patentees or those claiming under them may cut and use such trees as may be necessary for building, fencing or fuel, or for any other purpose essential to the working of mines.

Mining locations in unsurveyed territory shall be rectangular in shape, and the bearings of the outlines thereof shall be due north and south, and due east and west astronomically, and such locations shall be one of the following dimensions, viz: eighty chains in length by forty chains in width, containing 320 acres, or forty chains square,

containing 160 acres, or forty chains in length by twenty chains in width, containing 80 acres.

All such locations must be surveyed by a Provincial Land Surveyor, and be connected with some known point or boundary at the cost of the applicant, who must file with application surveyor's plan, field notes and description of location applied for.

In all patents for mining locations a reservation of five per cent. of the acreage is made for roads.

Lands patented under the Mining Act are free from all royalties or duties in respect to any ores or minerals thereon, and no reservation or exception of any mineral is made in the patents.

Lands situated south of the Mattawan River, Lake Nipissing and French River are sold under the Mining Act at one dollar per acre cash.

Affidavits showing no adverse occupation, improvement or claim should accompany applications to purchase.

T. B. PARDEE,
Commissioner
Department of Crown Lands, Toronto.



SEALED TENDERS addressed to the undersigned, and endorsed "Tender for McGregor's Creek," will be received at this office until Friday, the 23rd November next, for the construction of pile protection work at McGregor's Creek, town of Chatham, Kent County, Ontario, in accordance with a plan and specification to be seen at the Department of Public Works, Ottawa, and on application to Mr. A. McDonnell, C.E., P.L.S., Chatham.

Tenders will not be considered unless made on the form supplied and signed with the actual signatures of tenderers.

An accepted bank cheque, payable to the order of the Minister of Public Works, equal to five per cent. of amount of tender, must accompany each tender. This cheque will be forfeited if the party declines the contract, or fail to complete the work contracted for, and will be returned in case of non-acceptance of tender.

The Department does not bind itself to accept the lowest or any tender.

By order,
A. GOBEIL,
Secretary.
Department of Public Works,
Ottawa, 29th October, 1888

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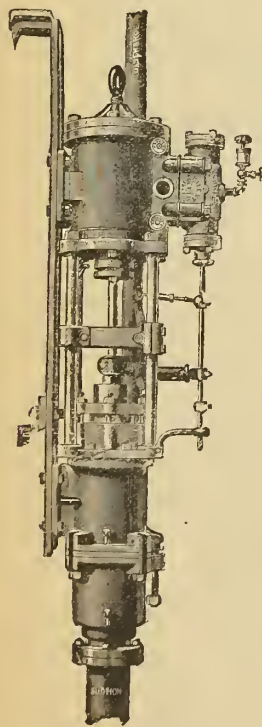
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Mineral Regulations

TO GOVERN THE DISPOSAL OF

Mineral Lands other than Coal Lands, 1886.

THESE REGULATIONS shall be applicable to all Dominion Lands containing gold, silver, cinnabar, lead, tin, copper, petroleum, iron or other mineral deposits of economic value, with the exception of coal.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein either by surface or subterranean prospecting for mineral deposits, with a view to obtaining under the Regulations a mining location for the same but no mining location or mining claim shall be granted until the discovery of the vein, lode or deposit of mineral or metal within the limits of the location or claim.

QUARTZ MINING.

A location for mining, except for iron on veins, lodes or ledges of quartz or other rock in place shall not exceed forty acres in area. Its length shall not be more than three times its breadth and its surface boundary shall be four straight lines, the opposite sides of which shall be parallel, except where prior locations would prevent, in which case it may be of such a shape as may be approved of by the Superintendent of Mining.

Any person having discovered a mineral deposit may obtain a mining location therefor, in the manner set forth in the Regulations which provides for the character of the survey and the marks necessary to designate the location on the ground.

When the location has been marked conformably to the requirements of the Regulations, the claimant shall within sixty days thereafter, file with the local agent in the Dominion Land Office for the district in which the location is situated, a declaration or oath setting forth the circumstances of his discovery, and describing, as nearly as may be, the locality and dimensions of the claim marked out by him as aforesaid; and shall, along with such declaration, pay to the said agent an entry fee of FIVE DOLLARS. The agent's receipt for such fee will be the claimant's authority to enter into possession of the location applied for.

At any time before the expiration of FIVE years from the date of his obtaining the agent's receipt it shall be open to the claimant to purchase the location on filing with the local agent proof that he has expended not less than FIVE HUNDRED DOLLARS in actual mining operations on the same; but the claimant is required, before the expiration of each of the five years, to prove that he has performed not less than ONE HUNDRED DOLLARS' worth of labor during the year in the actual development of his claim, and at the same time obtain a renewal of his mining receipt, for which he is required to pay a fee of FIVE DOLLARS.

The price to be paid for a mining location shall be at the rate of FIVE DOLLARS PER ACRE, cash, and the sum of FIFTY DOLLARS extra for the survey of the same.

No more than one mining location shall be granted to any individual claimant upon the same lode or vein.

IRON.

The Minister of the Interior may grant a location for the mining of iron, not exceeding 160 acres in area which shall be bounded by north and south and east and west lines astronomically, and its breadth shall equal its length. Provided that should any person making an application purporting to be for the purpose of

mining iron thus obtain, whether in good faith or fraudulently, possession of a valuable mineral deposit other than iron, his right in such deposit shall be restricted to the area prescribed by the Regulations for other minerals, and the rest of the location shall revert to the Crown for such disposition as the Minister may direct.

The regulations also provide for the manner in which land may be acquired for milling purposes reduction works or other works incidental to mining operations.

Locations taken up prior to this date may, until the 1st of August, 1886, be re-marked and re-entered in conformity with the Regulations without payment of new fees in cases where no existing interests would thereby be prejudicially affected.

PLACER MINING.

The Regulations laid down in respect to quartz mining shall be applicable to placer mining as far as they relate to entries, entry fees, assignments, marking of localities, agents' receipts, and generally where they can be applied.

The nature and size of placer mining claims are provided for in the Regulations, including bar, dry bench creek or hill diggings, and the RIGHTS AND DUTIES OF MINERS are fully set forth.

The Regulations apply also to

BED-ROCK FLUMES, DRAINAGE OF MINES AND DITCHES.

The GENERAL PROVISIONS of the Regulations include the interpretation of expressions used therein; how disputes shall be heard and adjudicated upon; under what circumstances miners shall be entitled to absent themselves from their locations or diggings, etc., etc.

THE SCHEDULE OF MINING REGULATIONS

Contains the forms to be observed in the drawing up of all documents such as:— "Application and affidavit of discoverer of quartz mine." "Receipt for fee paid by applicant for mining location." "Receipt for fee on extension of time for purchase of a mining location." "Patent of a mining location." "Certificate of the assignment of a mining location." "Application for grant for placer mining and affidavit of applicant." "Grant for placer mining." "Certificate of the assignment of a placer mining claim." "Grant to a bed rock flume company." "Grant for drainage." "Grant of right to divert water and construct ditches."

Since the publication, in 1884, of the Mining Regulations to govern the disposal of Dominion Mineral Lands the same have been carefully and thoroughly revised with a view to ensure ample protection to the public interests, and at the same time to encourage the prospector and miner in order that the mineral resources may be made valuable by development.

COPIES OF THE REGULATIONS MAY BE OBTAINED UPON APPLICATION TO THE DEPARTMENT OF THE INTERIOR.

A. M. BURGESS,

Deputy Minister of the Interior.

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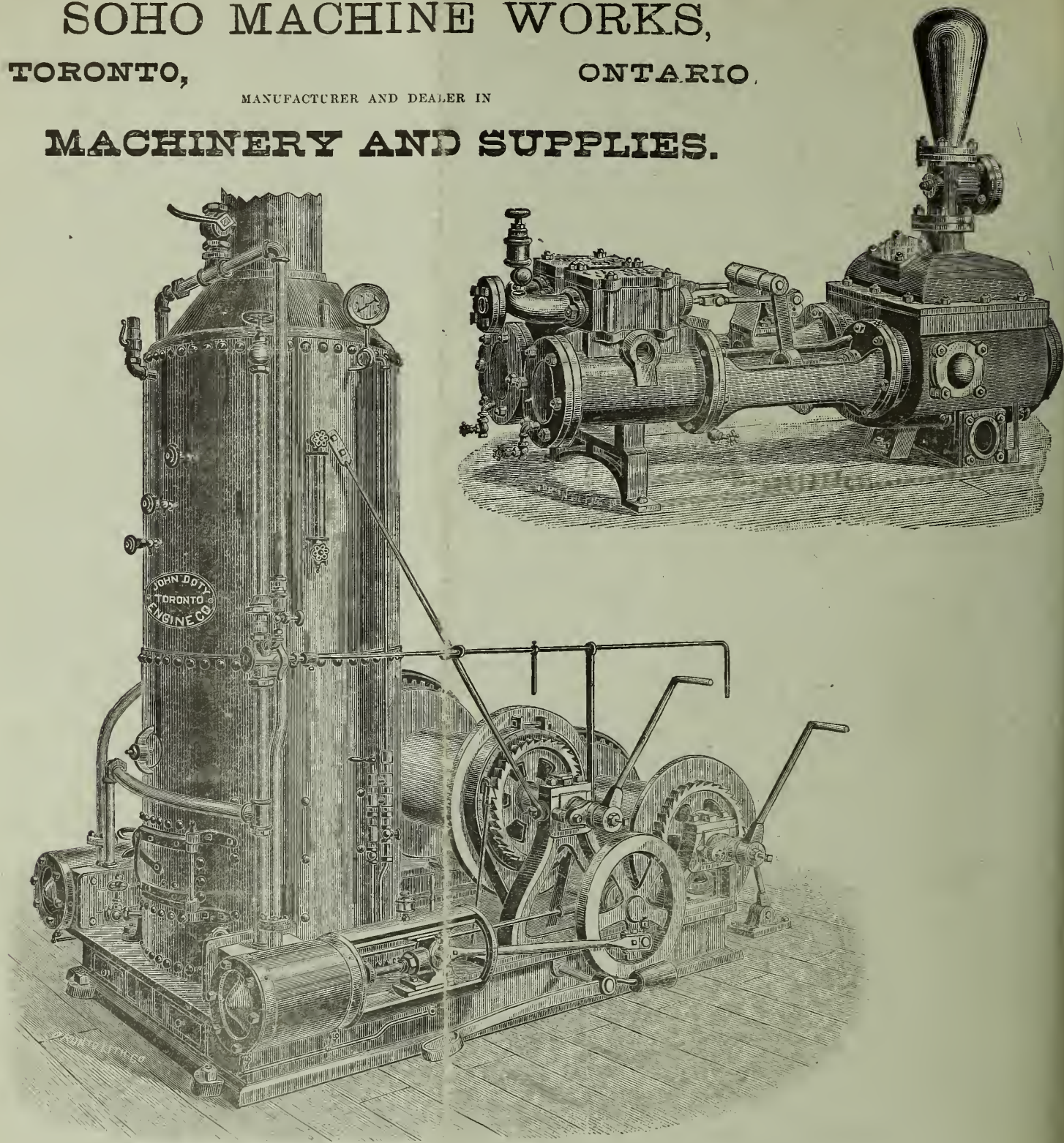
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